

GT100-MQ-IE

User Manual

V 3.4

Rev A



SST Automation

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Important Information

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1 Product Overview

1.1 Product Introduction

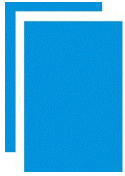
The **GT100-MQ-IE** is a wireless industrial gateway designed to seamlessly connect **Modbus RTU/ASCII Serial** and **Modbus TCP Ethernet** devices to the IoT Cloud via cellular wireless **MQTT**. The gateway features a GPS antenna for location tracking and supports **eMTC (LTE-M)** and **NB-IoT** cellular networks. It enables MQTT connections to various IoT cloud platforms such as Amazon AWS IoT, Microsoft Azure IoT, and generic MQTT servers.

Note: When using authentication to connect to AWS or Azure IoT, a valid **security certificate** is required.

The GT100-MQ-IE includes **two firmware modes**, which can be switched by downloading the corresponding BIN file which is included with the SST-MQT-CFG configuration software. For details on switching modes, please refer to [Appendix B](#) of this user manual.

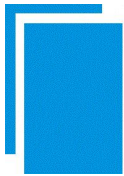
The following table lists the specific functions supported in each firmware mode:

Firmware Mode	Description
A: Modbus TCP Client / Modbus Master	Functions as a Modbus TCP Client and Modbus RTU/ASCII Master
B: Modbus TCP Server / Modbus Master-Slave	Functions as a Modbus TCP Server and Modbus RTU/ASCII Master/Slave



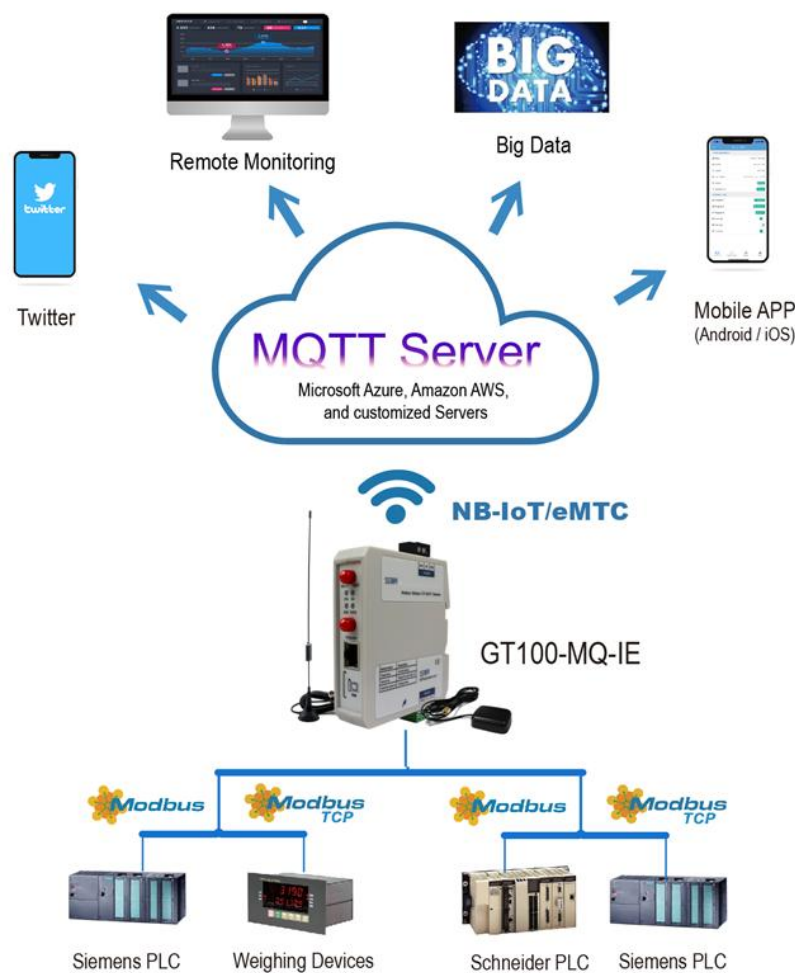
1.2 Key Features

- One RS485 Interface - Modbus Master/Slave
 - ✧ **As Modbus Master:** Connects field devices to the IoT Cloud Platform, enabling data acquisition and device control via the eMTC / NB-IoT network.
 - ✧ **As Modbus Slave:** Integrates PLCs, DCS systems, and other Modbus master stations with the IoT Cloud Platform via the eMTC / NB-IoT network.
- One Ethernet Interface - Modbus TCP Client/Server
 - ✧ **As Modbus TCP Client:** Connects Modbus TCP Server devices, such as intelligent instruments.
 - ✧ **As Modbus TCP Server:** Connects Modbus TCP Client devices, such as SCADA systems.
- Built-in GPS for device location tracking.
- Reliable network connectivity over eMTC / NB-IoT, featuring connection detection and automatic reconnection.
- Supports MQTT broker connections via URL.
- **Security:** TLS V1.2 and DTLS 1.0/1.2 supported. Supports custom Client ID.
- Supports MQTT version 3.1.1.
- Customizable JSON message format for MQTT.
- Supports QoS levels 0 and 1.
- Two MQTT publishing modes:
 1. **Change of Value Mode:** Publishes data only when values change.
 2. **Cyclic Mode:** Publishes data periodically at user-defined intervals to reduce data traffic.
- Real-time device status monitoring on the IoT Cloud Platform.
- eMTC / NB-IoT signal quality detection and display.
- **Designed for industrial environments**, offering high reliability, real-time monitoring, and automatic reset.



1.3 Typical Applications

The GT100-MQ-IE is widely used in unmanned or remote industrial environments such as water quality monitoring stations, environmental monitoring stations, intelligent building automation, smart agriculture, and energy and power management systems that require remote monitoring and data acquisition.

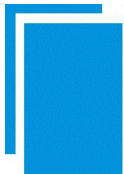


Modbus RTU/ASCII and Modbus TCP devices connected to the IoT Cloud via MQTT



1.4 Technical Specifications

Modbus Serial Interface Features	
Serial Interface	One (1) RS485 interface
Interface Connector	3.81 mm 3-pin terminal block
Galvanic Isolation	1kV photoelectric isolation
Baud Rates	600 bps, 1200 bps, 2400 bps, 4800 bps, 9600 bps, 19.2 kbps, 38.4 kbps, 57.6 kbps, 115.2 kbps
Parity Options	None, Odd, Even, Mark, Space
Stop Bits	1 or 2
Serial Operation Modes	Modbus RTU Master Modbus RTU Slave Modbus ASCII Master Modbus ASCII Slave
Modbus Function Codes Supported	01: Read Coils 0x 02: Read Discrete Inputs 1x 03: Read Holding Registers 4x 04: Read Input Registers 3x 05: Single Coil Write 0x 06: Single Register Write 4x 15: Multiple Coil Write 0x 16: Multiple Register Write 4x
Maximum Number of Modbus Serial Slave Devices	Without Repeater: Up to 31 Slave devices With Repeater: Up to 127 Slave devices
Maximum Input Size	As Master: Up to 1024 Bytes As Slave: Up to 512 Bytes
Maximum Output Size	As Master: Up to 1024 Bytes As Slave: Up to 512 Bytes
Maximum Number of Modbus Commands (As Master)	Up to 100 Modbus commands
Byte Swap Modes	No swap Two Byte Swap (0x1234 => 0x3412) Four Byte Swap (0x12345678 => 0x78563412)



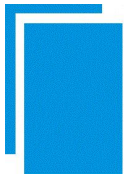
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Modbus TCP Interface Features

Ethernet Interface	One (1) RJ45 10/100M full-duplex / half-duplex auto-negotiation Ethernet port.
IP Address Assignment Modes Supported	Static IP Addressing (Manual Configuration) DHCP (Auto IP)
Modbus TCP Operation Modes	Modbus TCP Client (Master) Modbus TCP Server (Slave)
Modbus Function Codes Supported	01: Read Coils 0x 02: Read Discrete Inputs 1x 03: Read Holding Registers 4x 04: Read Input Registers 3x 05: Single Coil Write 0x 06: Single Register Write 4x 15: Multiple Coil Write 0x 16: Multiple Register Write 4x
Maximum Number of Modbus TCP Client (Master) Devices	Up to 4 Modbus TCP Client (Master) devices
Maximum Number of Modbus TCP Server (Slave) Devices	Up to 4 Modbus TCP Server (Slave) devices
Maximum Input Size	As Modbus TCP Client: Up to 1024 Bytes As Modbus TCP Server: Up to 512 Bytes
Maximum Output Size	As Modbus TCP Client: Up to 1024 Bytes As Modbus TCP Server: Up to 512 Bytes
Maximum Number of Modbus Commands (As Modbus TCP Client)	Up to 100 Modbus commands



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MQTT Interface Features

Wireless Cellular Interface	One (1) eMTC / NB-IoT Cellular Module
Range of Operating Frequencies	B1: 1920MHz - 1980MHz Uplink, 2110MHz - 2170MHz Downlink B2: 1850MHz - 1910MHz Uplink, 1930MHz - 1990MHz Downlink B3: 1710MHz - 1785MHz Uplink, 1805MHz - 1880MHz Downlink B4: 1710MHz - 1755MHz Uplink, 2110MHz - 21550MHz Downlink B5: 824MHz - 849MHz Uplink, 869MHz - 894MHz Downlink B8: 880MHz - 915MHz Uplink, 925MHz - 960MHz Downlink B12: 698MHz - 716MHz Uplink, 728MHz - 746MHz Downlink B13: 777MHz - 787MHz Uplink, 746MHz - 756MHz Downlink B14: 788MHz - 798MHz Uplink, 758MHz - 768MHz Downlink B18: 815MHz - 830MHz Uplink, 860MHz - 875MHz Downlink B19: 830MHz - 845MHz Uplink, 875MHz - 890MHz Downlink B20: 832MHz - 862MHz Uplink, 791MHz - 821MHz Downlink B25: 1850MHz - 1915MHz Uplink, 1930MHz - 1995MHz Downlink B26: 814MHz - 849MHz Uplink, 859MHz - 894MHz Downlink B27: 807MHz - 824MHz Uplink, 852MHz - 869MHz Downlink B28: 703MHz - 748MHz Uplink, 758MHz - 803MHz Downlink B66: 1710MHz - 1780MHz Uplink, 2110MHz - 220MHz Downlink B85: 698MHz - 716MHz Uplink, 728MHz - 746MHz Downlink



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Wireless Bands	CAT-M (eMTC / LTE-M): B1/B2/B3/B4/B5/B8/B12/B13/B14/B18/B19/ B20/B25/B26/B27/B28/B66/B85 CAT-NB (NB-IoT): B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/ B25/B26/B28/B66/B71/B85
Maximum Transmission Power	LTE RF Power Class: 5 Highest Power Output: 25.7 dBm
Wireless Communication Standards	eMTC (LTE-M) NB-IoT
APN (Access Point Name) Modes	Auto Match (Automatically Obtained) Manually Assign
Transmission Speed	CAT-M (eMTC / LTE-M): Uplink: 1119 Kbps Downlink: 589 Kbps CAT-NB (NB-IoT): Uplink: 150 Kbps Downlink: 136 Kbps
Maximum Number of MQTT Data Tags	Up to 1024 Data Tags
Electrical/Environmental	
Power Supply Input Voltage	24VDC (Range 11V to 30V)
Operating Temperature	-4°F to 140°F (-20°C to 60°C)
Relative Humidity	5% to 95% RH (non-condensing)
Certification	CE Compliant to EMC Test Standards
Hardware	
Dimensions (W × H × D)	1.0in × 4.0in × 3.6in (25mm × 100mm × 90mm)
Mounting	35mm DIN Rail
Enclosure Protection Rating	IP20
Power Interfaces	One (1) 3-Pin Terminal Block



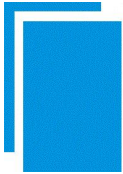
1.5 Related Products

The related products include: GT200-MQ-IE, GT100-MQ-RS, GT200-MQ-BMT etc.

To get more information about related products, please visit SST Automation's website: www.sstautomation.com.

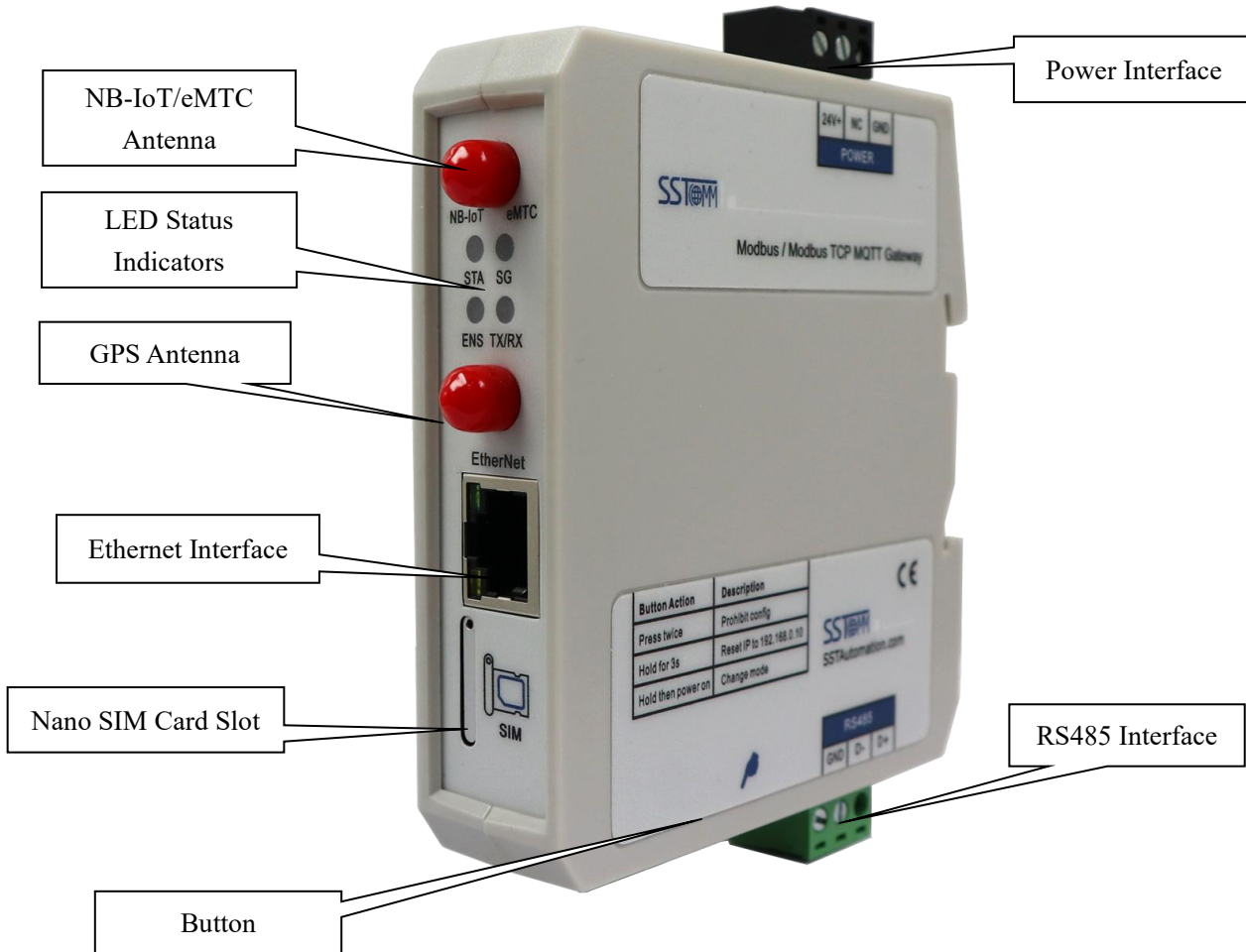
1.6 Revision History

Revision	Date	Chapter	Description
V3.0, Rev A	12/24/2021	ALL	New release
V3.1, Rev A	1/3/2023	ALL	New release
V3.4, Rev A	11/5/2025	ALL	New release Added RETAIN flag functionality to topics that support publishing permissions. Added the option to configure the number of MQTT attribute tags per message (8 or 20). Increased the maximum number of supported topics from 25 to 50. Expanded the Modbus TCP master input/output capacity from 512 bytes to 1024 bytes, and increased supported MQTT attributes to 1024 tags. Added functionality to configure a remote update server, and changed the heartbeat interval to 500 seconds. Added fast scan and slow scan functionality for the Modbus TCP Master interface. Upon startup, both fast scan and slow scan commands will be sent after the specified the polling cycle time.



2 Hardware Overview

2.1 Product Appearance



Note: This image is for reference only. The actual product may differ in appearance.



2.2 LED Status Indicators

Indicator	State	State Description
STA	OFF	The wireless module is not started.
	Flashing Green (Short, Slow) (200 ms ON / 1800 ms OFF)	The gateway is searching for an available network.
	Flashing Green (Long, Slow) (1800 ms ON / 200 ms OFF)	The wireless module is in standby.
	Flashing Green (Fast) (125 ms ON / 125 ms OFF)	Data is being transmitted via the wireless module.
SG	OFF	The SIM card is invalid or not detected.
	Solid Green	Either: • Attempting to establish a connection. • Connection failed to establish.
	Flashing Green (Slow) (1000 ms ON / 1000 ms OFF)	Poor signal strength.
	Flashing Green (Normal) (500 ms ON / 500 ms OFF)	Normal signal strength.
	Flashing Green (Fast) (125 ms ON / 125 ms OFF)	Strong signal strength.

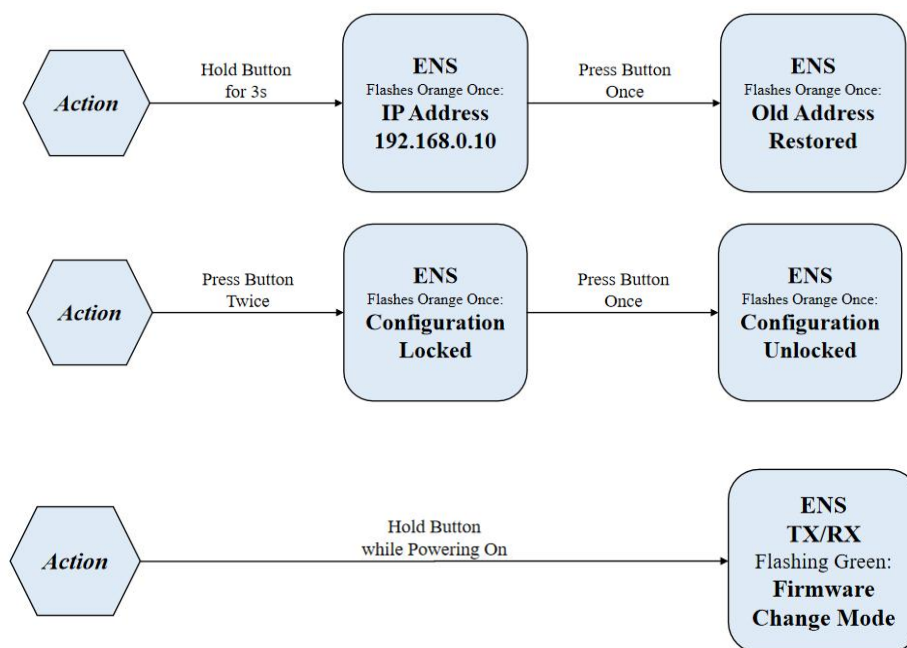
TX/RX	Flashing Green	The serial port is receiving data.
	Flashing Red	The serial port is transmitting data.
ENS	Flashing Green (Slow)	No Modbus TCP connection.
	Flashing Green (Fast)	Operating with a fixed IP address: 192.168.0.10
	Flashing Red	Either: • Running the locate function. • Disconnecting after a successful TCP connection.
	Solid Green	Modbus TCP connection established.



2.3 Button Functions

The functions and operating instructions for the button are described as follows:

Button Action	Function Description
Long Press (3 seconds)	Sets the IP address to 192.168.0.10 , the ENS indicator will flash green rapidly to show that the IP address has been set. Press the button again to set the IP address back to the previous configuration. (Use this function if the IP address of the gateway is unknown or the device cannot be detected using the configuration software.)
Double Press	Lock/Unlock Configuration. Double press the button to disables configuration upload/download. While the lock is enabled, the GT100-MQ-IE can still be discovered but cannot be configured. While the lock is enabled, press the button once to turn off the lock. (Use this function to prevent unauthorized configuration changes. For example, to avoid misconfiguration when multiple GT100-MQ-IE gateways are in the same LAN.)
Press and Hold While Powering On	Puts the gateway into Firmware Update Mode . This function is used to change the gateway's firmware to support different Modbus operation modes. Please refer to Appendix B for detailed operation steps.

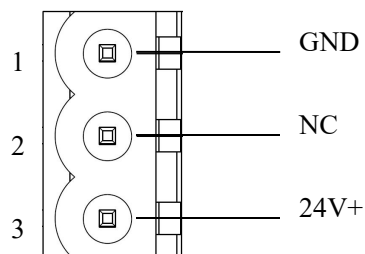




2.4 Interfaces

2.4.1 Power Interface

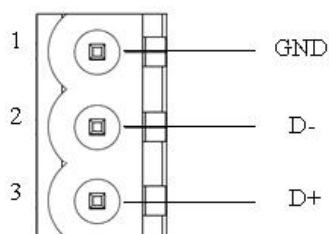
Pin	Function
1	Power GND (Negative)
2	NC (Not Connected)
3	24V+ (DC 24V Positive)



2.4.2 RS485 Serial Interface

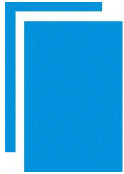
The GT100-MQ-IE gateway has an RS485 serial interface. The interface uses a 3-pin terminal block connector, and the wiring is shown as follows:

Pin	Function
1	GND
2	D-, RS485
3	D+, RS485



RS485 Serial Characteristics:

- Network topology: Linear bus with active terminal resistors installed at both ends. If the communication quality is unstable, it is recommended to add terminal resistors (120Ω, 1/2W) at both ends.
- Recommended Transmission Medium: Shielded twisted-pair cable (shielding optional depending on environmental EMC conditions).
- Number of Nodes: Up to 31 nodes per segment (without repeater), and expandable up to 127 nodes through the use of an RS485 repeater).



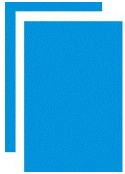
2.6.3 Ethernet Interface

The Ethernet interface uses a standard RJ45 connector.

Pin	Signal Description
S1	TXD+
S2	TXD-
S3	RXD+
S4	-
S5	-
S6	RXD-
S7	-
S8	-

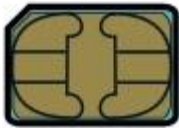


RJ-45 port



2.6.4 Nano SIM Card Slot

Use an IoT SIM card that supports eMTC (LTE-M, CAT-M) or NB-IoT (CAT-NB) networks.



Format: Nano-SIM (4FF)

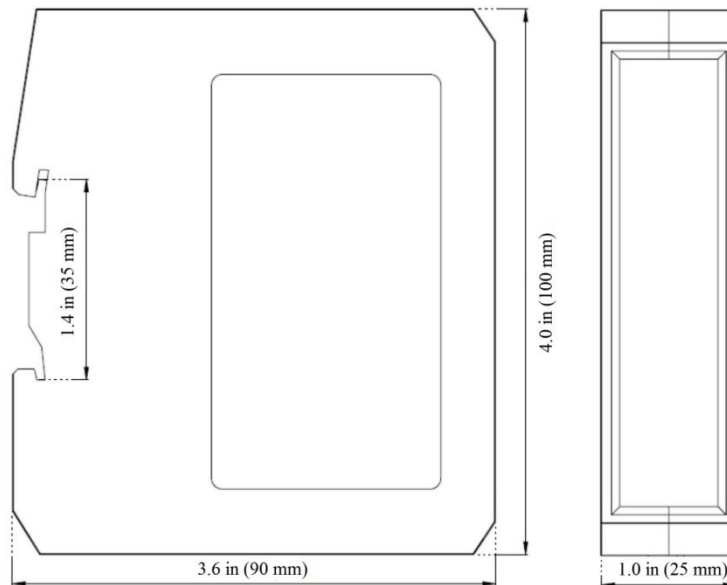
Dimensions (Length × Width): 12.3mm × 8.8 mm (0.48 in × 0.35 in)

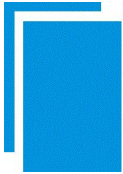
Thickness: 0.67 mm (0.026 in)

2.7 Mechanical Dimensions

Dimensions (Width × Height × Depth):

1.0 in × 4.0 in × 3.6 in (25 mm × 100 mm × 90 mm)

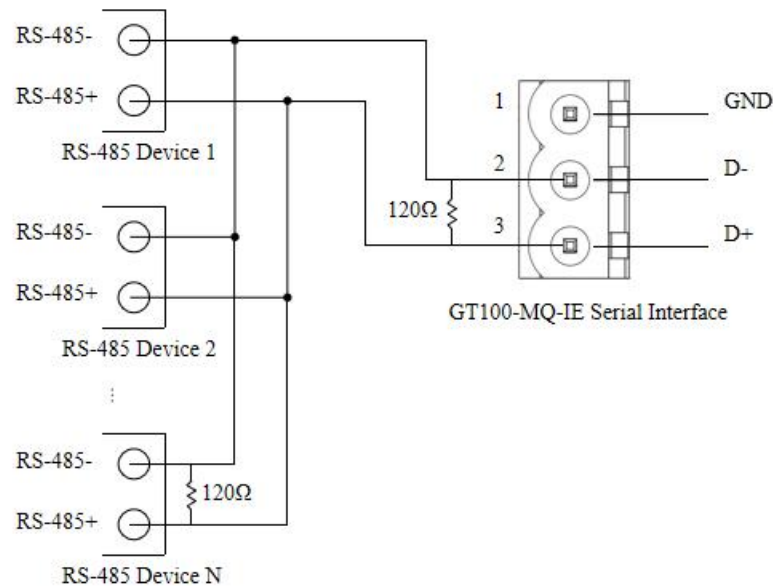


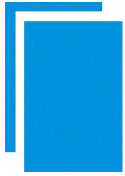


3 Installation and Wiring

3.1 RS485 Bus Wiring

Note: The GT100-MQ-IE does not include a built-in terminal resistor on the RS485 serial interface. When connecting multiple RS485 serial devices, it is recommended to install terminal resistors (120Ω , 1/2W) in parallel at both ends of the communication bus to ensure stable and reliable communication.





3.2 EtherNet Network Connection

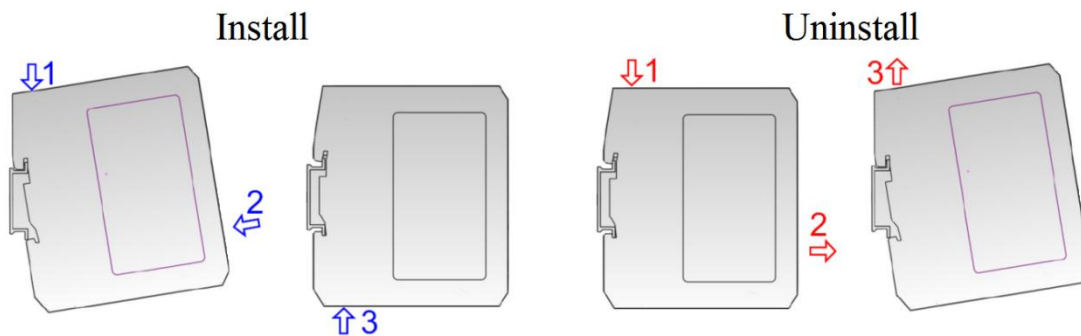
1. Connect Modbus TCP clients/servers using an Ethernet cable.
2. Connect the GT100-MQ-IE to a PC using an Ethernet cable to perform the configuration.

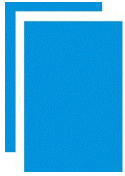
3.3 Antenna and SIM Card Installation

1. Insert the Nano SIM card into the slot on the front side of the GT100-MQ-IE gateway, ensuring correct orientation.
2. Connect the NB-IoT /eMTC network antenna (long straight antenna) and the GPS antenna (square head antenna) to the GT100-MQ-IE gateway.

3.4 Installation Method(DIN Rail)

Mount the gateway on a 35 mm (1.4 in) DIN rail.

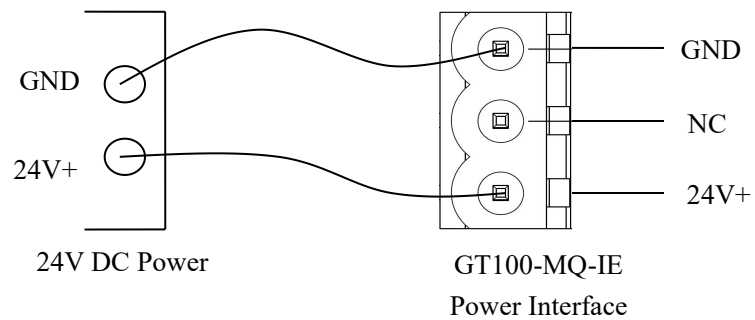


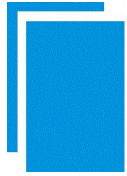


3.5 Power Connection

Connect the power supply as shown below.

Note: Do not power on the device until all the connections have been completed.





4 Configuration Guide

SST-MQT-CFG is the configuration software used to configure the GT100-MQ-IE gateway. The software can be downloaded from the Product Page or the Download Page (www.sstautomation.com/Download1/) of the SST Automation website.

The software is compatible with the following Windows operating systems:

- Windows 7
- Windows 10
- Windows 11

4.1 Software Introduction (SST-MQT-CFG)

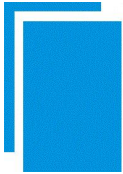
Double click the SST-MQT-CFG icon to open the Device Selection interface:



Select "GT100-MQ-IE" and click OK, then select the desired operation Mode:

Note: Select the Mode that matches the actual Firmware type installed on the GT100-MQ-IE. The default factory firmware mode is "A: Modbus TCP Client / Modbus Master".

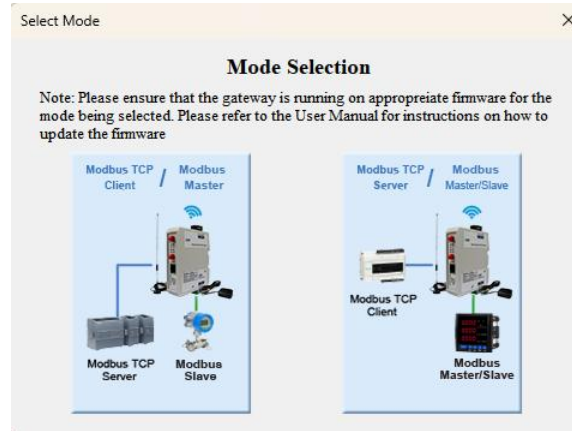
If you need to change the firmware mode of the gateway, refer to [Appendix B](#) for detailed instructions.



GT100-MQ-IE

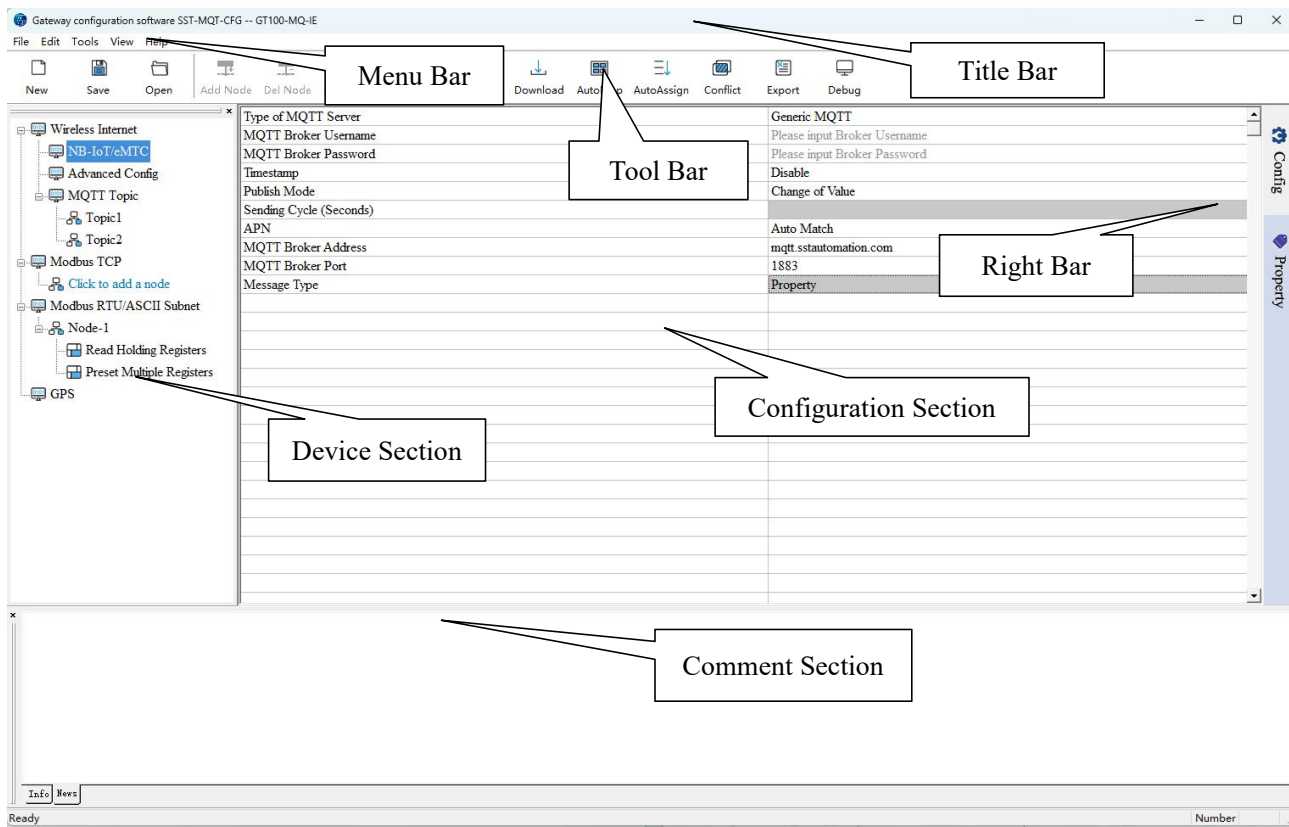
Modbus / Modbus TCP / MQTT Gateway

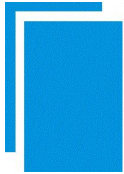
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Select the appropriate mode and click OK. For example, select "Modbus TCP Client/Modbus Master" mode then click OK to open the corresponding configuration interface.

Note: All gray fields in the software cannot be modified.





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Toolbar:



The function from left to right is: New, Save, Open, AddNode, DelNode, AddCmd, DelCmd, Upload, Download, AutoMap, Conflict, Export and Debug.



New: Create a new configuration project.

Save: Save the current configuration.

Open: Open a configuration project.

Add Node: Add a Modbus node.

Delete Node: Delete a Modbus node.

Add Command: Add a Modbus command.

Delete Command: Delete a Modbus command.

Upload: Upload the configuration from the gateway.

Download: Download the configuration to the gateway.

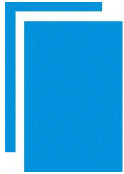
Auto Map: Automatically calculate the mapped data address of each command.

AutoAssign: Automatically sort all attribute names.

Conflict Detection: Check whether the configured commands' mapped data addresses conflict with others in the gateway data buffer.

Export Excel: Export current configuration as a table and save it as *.xls file.

Debug: Not currently supported.

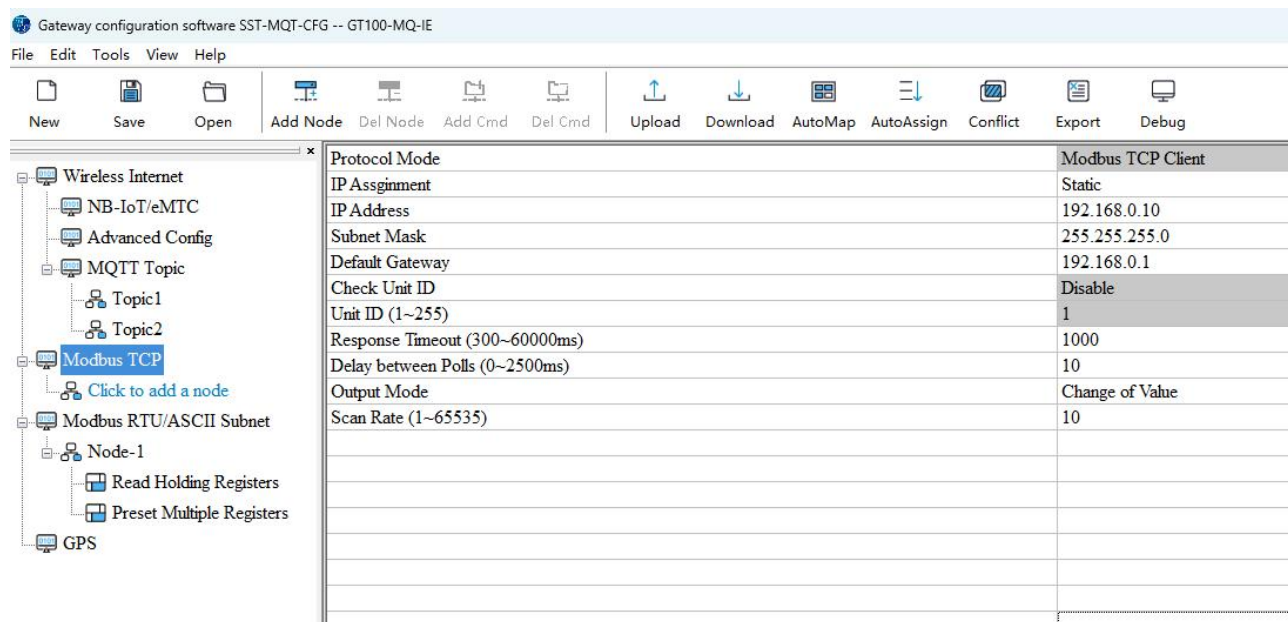


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4.2 IP Address Settings



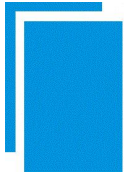
Select Protocol: Modbus TCP Client. At this time, the gateway acts as a Modbus TCP client to connect to the Modbus TCP Server device.

Assign IP Mode: Supports Static / DHCP. In DHCP mode, the gateway needs to connect to a DHCP server or switch to get valid IP address.

IP Address: IP Address of the GT100-MQ-IE. The device can be searched when the IP address is in the same network segment with the computer.

Whether you use this protocol or not, please assign an IP address to the gateway. Because the configuration software searches the gateway through the IP address for uploading/downloading configuration.

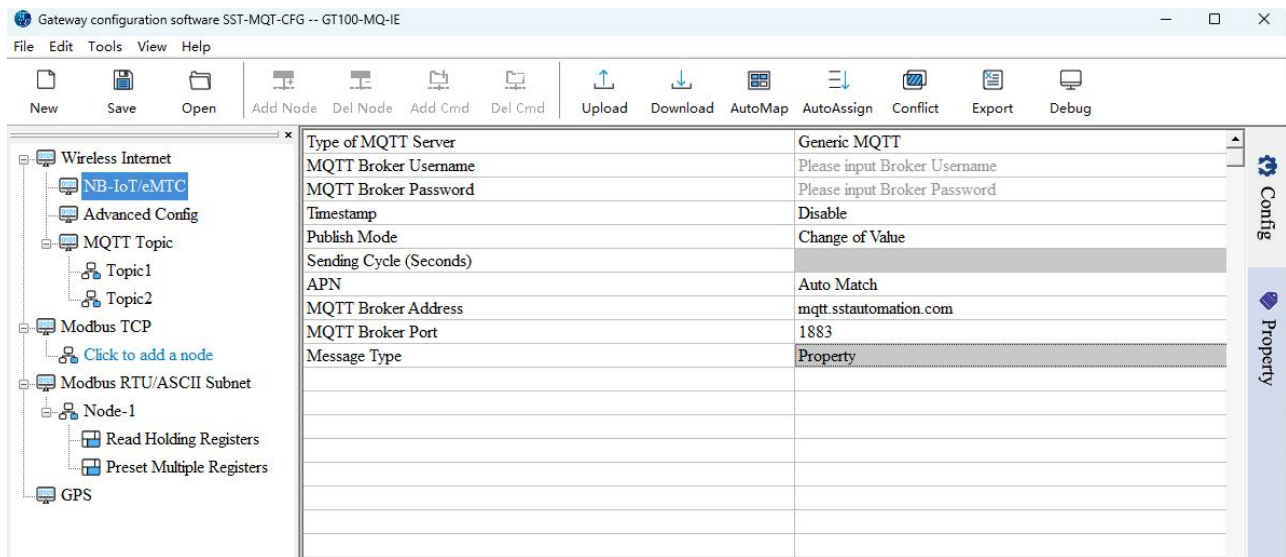
Subnet Mask: Subnet mask of the GT100-MQ-IE.



4.3 Wireless Internet

4.3.1 MQTT Broker Settings

Select the "NB-IoT/eMTC" in the left tree view and enter the NB-IoT/eMTC configuration window.



Type of MQTT Server: Supports generic MQTT servers.

MQTT Broker Username: The username used for authentication with the MQTT broker. Please refer to the corresponding MQTT server guide for more details.

MQTT Broker Password: The password used for authentication with the MQTT broker. Please refer to the corresponding MQTT server guide for more details.

Timestamp: Indicates the time when the data is collected by the gateway. When enabled, the timestamp will be published along with the data.

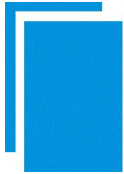
Publish Mode: Supports two publishing modes: Change of Value and Cyclic

Change of Value: Publish messages only when data values change.

Cyclic: Publish messages periodically at a defined interval.

Sending Cycle: Specifies the interval for publishing messages in Cyclic Mode. Range: 5–100000s. The default value is 60s. This setting is valid only when the Publish Mode is set to "Cyclic".

APN: Supports both Auto Match and Custom configurations. The APN (Access Point Name) is used to identify the mobile network type. Please contact your network operator for the correct APN details.



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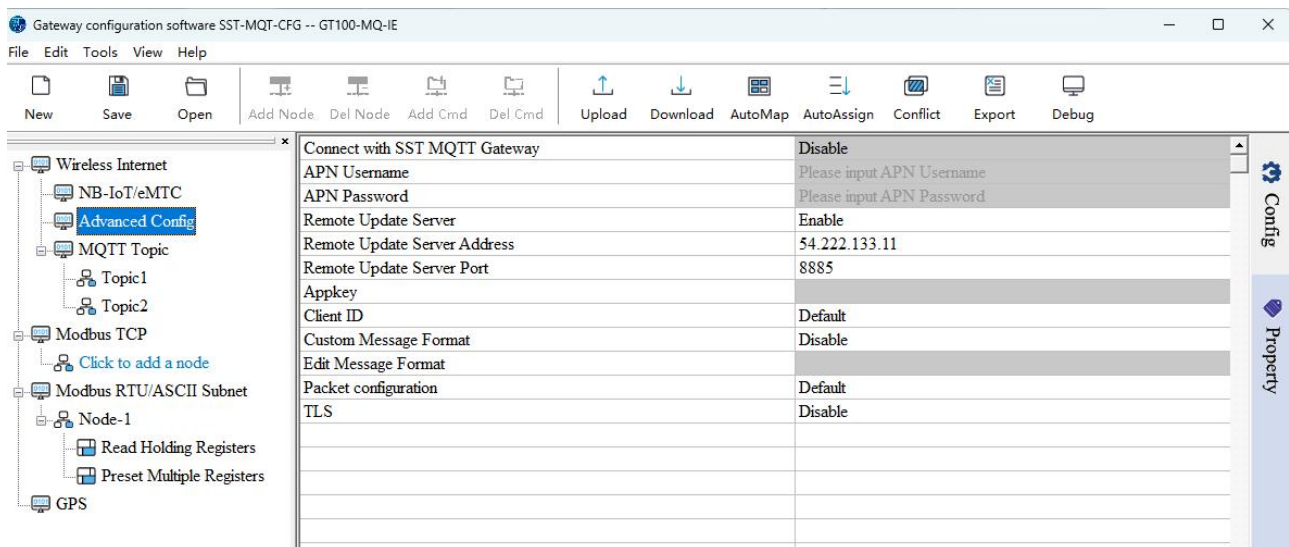
- MQTT Broker Address:** Specifies the URL or IP Address used to connect to the MQTT broker. Please refer to the corresponding MQTT Server guide for more details.
- MQTT Broker Port:** Specifies the TCP port number of the MQTT broker. Please refer to the corresponding MQTT Server guide for more details.
- Message Type:** Currently, only the "Property" format is supported.

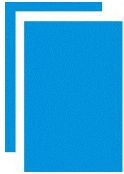
Property: The data is transmitted along with its properties in the following message format:

```
{
  "version":    "3.4.4.2",
  "time":       "19/03/25,17:04:07",
  "properties":{
    "BI3":      false,
    "BI4":      true,
    "BI5":      false,
    "BI6":      false
  }
}
```

4.3.2 MQTT Advanced Config

Select "Advanced Config" in the left-hand tree view to open the Advanced Configuration window.





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Connect with SST MQTT Gateway: Not supported at this time.

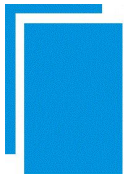
APN Username: Provided by the network operator and used for authentication. It can be modified only when "APN" is set to "Customize".

APN Password: Provided by the network operator and used for authentication. It can be modified only when "APN" is set to "Customize".

Remote Update Server Address: The default remote update service IP Address is 54.222.133.11. The gateway can be updated remotely by SST Automation. Please do not change this IP address.

Remote Update Server Port: The default remote update server port is 8885. The gateway can be updated remotely by SST Automation. Please do not change this port.

Client ID: Specifies the Client ID for the gateway. The default ID is the serial number of the gateway. When connecting to an MQTT Server, each Client must have a unique ID. It is recommended to use the default ID.



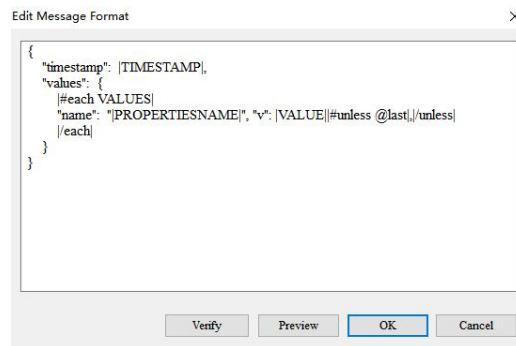
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Custom Message Format: If enabled, the message format is defined by "Edit Message Format".

Edit Message Format: *(Applies only to the format of published data)*



For example:

```
{
  "timestamp": |TIMESTAMP|,
  "values": {
    |#each VALUES|
    "name": "|PROPERTIESNAME|", "v": |VALUE| #unless @last|, /unless|
    |/each|
  }
}
```

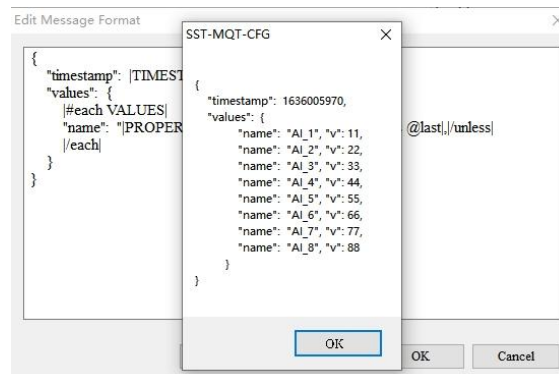
|PROPERTIESNAME| is the property name

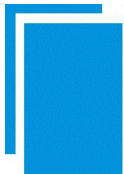
|VALUE| is the value of the tag

|TIMESTAMP| is the time to read the tag

Please see the ["Custom Message Format"](#) chapter for more details.

Click "Verify" to verify the JSON format, then click "Preview" to see a message preview.





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Packet configuration:

Specifies the maximum number of MQTT attribute tags included in each data packet.

Default: 8 attributes per packet

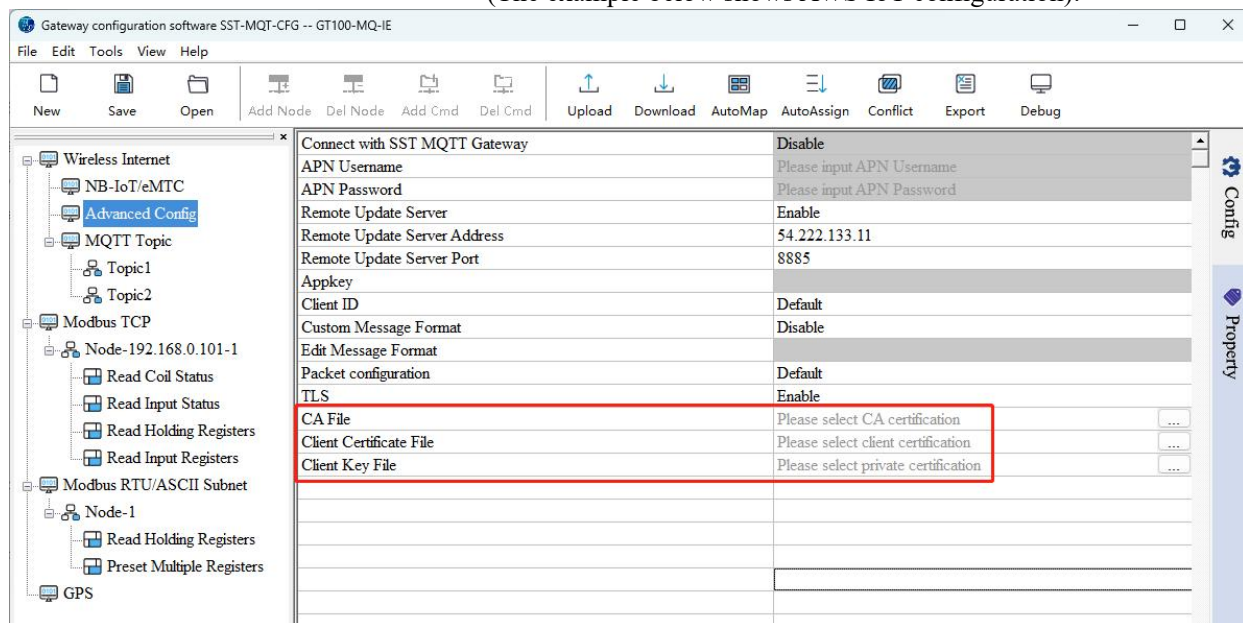
Extendable: Up to 20 attributes per packet

TLS:

When enabled, the gateway supports connections using TLS V1.2 encryption. For detailed setup instructions, please refer to the corresponding MQTT Server guide for more details.

Certificate Configuration:

This section is only displayed when "TLS" is enabled.
(The example below shows AWS IoT configuration):



CA File:

The CA certificate provided by AWS IoT Core. Please refer to AWS IoT Core Developer Guide for details.

Client Certificate File:

The client certificate issued by AWS IoT Core.

Client Key File:

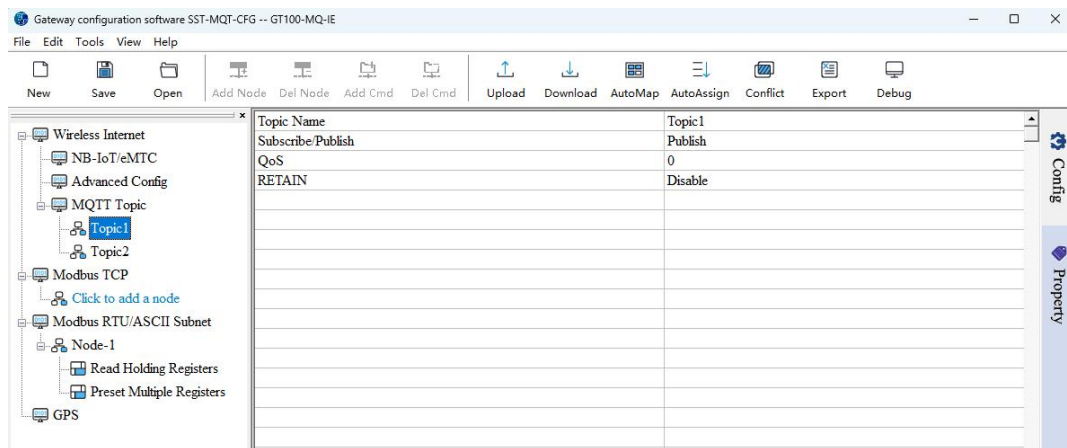
The private key issued by AWS IoT Core.

4.3.3 MQTT Topic Configuration

Right click "MQTT Topic" to add a new topic. To delete an existing topic, right-click the topic and select "Delete Topic".

After adding a Topic, select it from the left-hand tree view to open the Topic Configuration window:

Note: For detailed information on configuring the Property fields, please refer to [Chapter 4.7.1 Property Configuration](#).



Topic Name: The topic name can include letters, numbers, underscores (_), slashes (/), hyphens (-), and dollar signs (\$). The length must be less than 128 characters. Supports up to 25 Topics.

Subscribe/Publish: There are three available options: "Publish", "Subscribe", or "Publish and Subscribe".

Publish: The gateway sends data to the MQTT broker.

Subscribe: The gateway receives data from the MQTT broker.

Publish and Subscribe: The gateway both sends and receives data on the same topic.

QoS: Quality of Service. Supports QoS 0 and QoS 1.

QoS 0: The gateway sends the data packet only once without acknowledgement. Suitable for less critical data.

QoS 1: The gateway requires an acknowledgement (ACK) from the MQTT broker to confirm successful delivery. Data will be retransmitted until acknowledged or after 3 attempts.

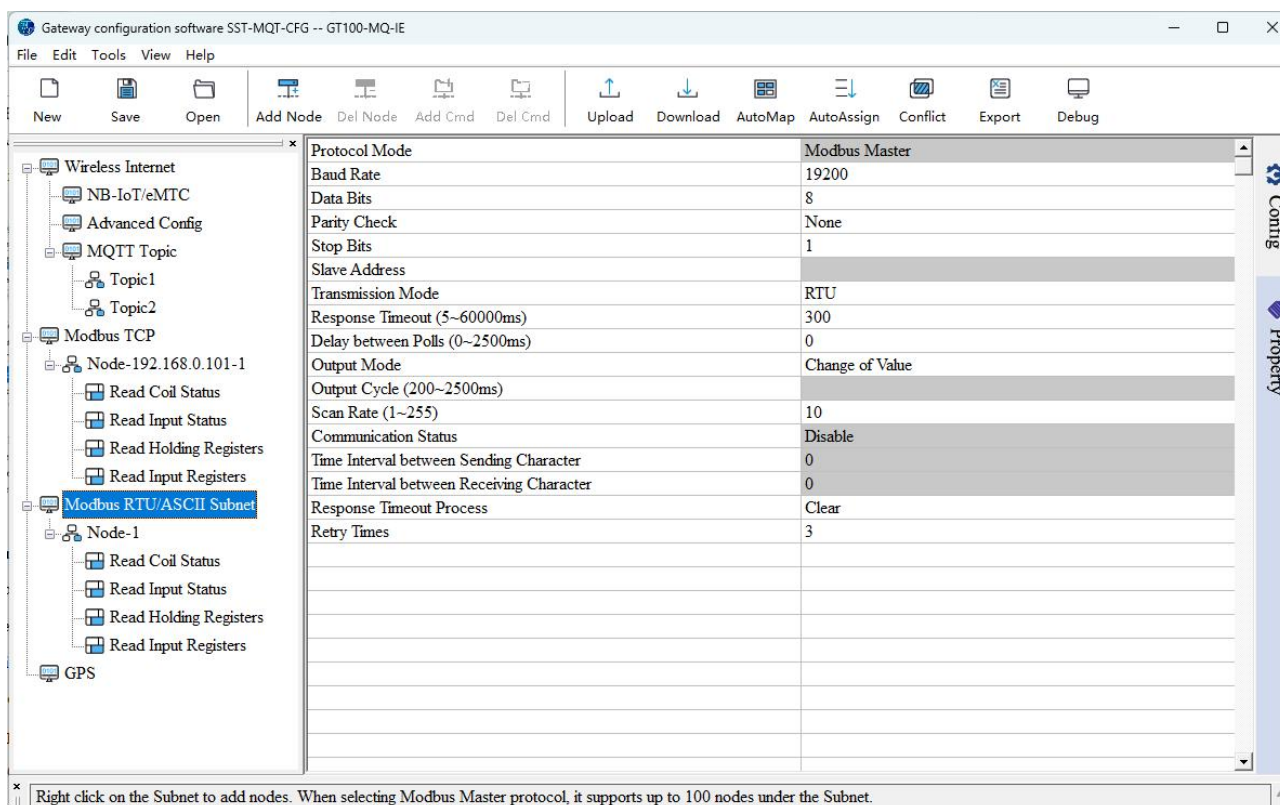
RETAIN: When enabled, messages published to the topic are stored as retained messages on the MQTT broker. When a new subscriber joins the topic, the broker will immediately send the retained message to the subscriber. Each topic can store only one retained message at a time. New retained messages will overwrite previous ones. This feature applies only to publish topics.

Default: Disabled

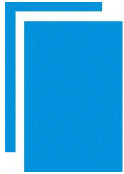
4.4 Modbus RTU/ASCII Parameters

4.4.1 Modbus RTU/ASCII Master Configuration

Select "Subnet" from the left-hand tree view to open the Modbus interface configuration window.



- Select Protocol:** Specifies the current communication protocol in use.
- Baud Rate:** Sets the Baud Rate for the serial interface. Supported values: 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps.
- Data Bits:** Specifies the number of data bits per byte.
- Parity Check:** Selects the parity check mode. Options: Odd, Even, None, Mark or Space.
- Stop Bits:** Specifies the number of stop bits. Options: 1 or 2.
- Slave Address:** Not applicable when the "Modbus Master" protocol is selected.
- Transmission Mode:** Specifies the Modbus transmission mode. Options: RTU or ASCII.
- Response Timeout:** Specifies the waiting time for a response from the Modbus Slave after a command is sent by the Modbus Master.
Range: 5~60000ms. This parameter is not applicable for the "Modbus Slave" protocol.



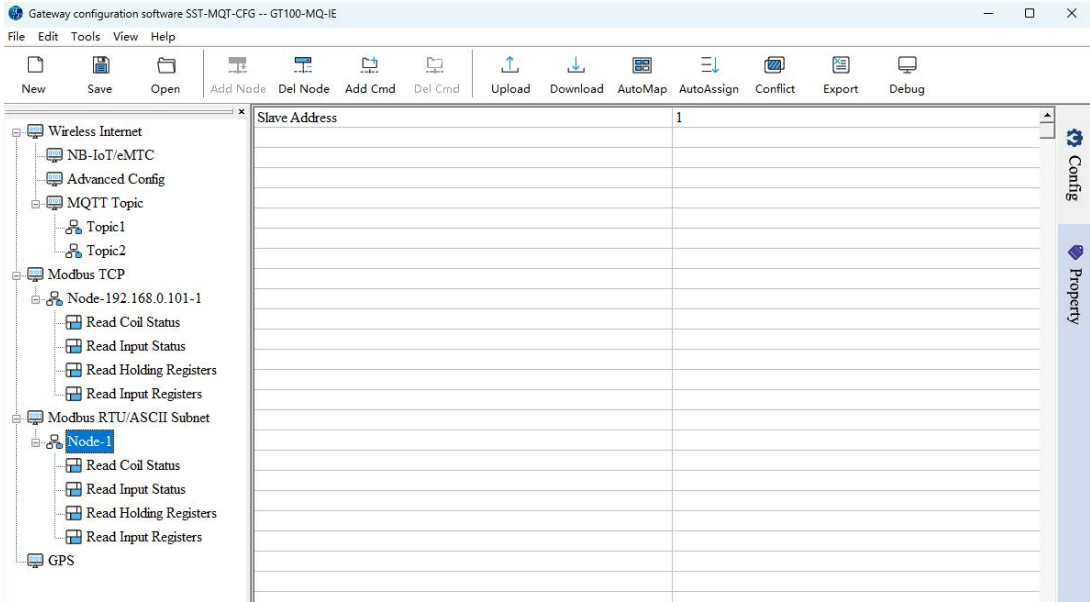
- Delay between Polls:** Specifies the delay time before the Modbus Master sends the next command after the previous command has received a valid response timed out.
Range: 0–2500ms. (in multiples of 10 ms)
Example: An input value is 9 results in a delay of 0ms, while a value of 15 results in a delay of 10ms.
Not applicable to the "Modbus Slave" protocol.
- Output Mode:** Defines how write commands are sent.
Options: Cyclic, Forbidden, Change of Value.
Not applicable to the "Modbus Slave" protocol.
Cyclic: Write commands are sent periodically.
Forbidden: Write commands are disabled.
Change of Value: Write commands are sent only when output data changes.
- Output Cycle:** Specifies the period for sending write commands.
Range: 200–2500ms.
Not applicable to the "Modbus Slave" protocol.
- Scan Rate:** Defines the ratio between fast-scan commands to slow-scan commands.
Example: If set to 10, one slow-scan command is sent after every ten fast-scan commands.
Not applicable to the "Modbus Slave".
- Communication Status:** Unused. Displays the Modbus command status.
This feature is disabled by default and cannot be modified. The first few bytes indicate the Modbus command status. Bit0 of Byte1 represents the first command and Bit1 of Byte2 represents the tenth command.
The initial value is 0. When the communication is normal, the value is 1.
- Time Interval between Sending Character:** Unused. Specifies the interval between transmitting each byte.
- Time Interval between Receiving Character:** Unused. Specifies the interval used to determine when to stop receiving a frame of data.
- Response Timeout Process:** Specifies how the gateway handles a timeout when no response is received within the configured "Response Timeout" period.
Not applicable to the "Modbus slave" protocol.
Clear: Clears the input buffer (sets all response data to zero).
Hold: Retains the last received data in the input buffer.
- Retry Times:** Specifies the number of retries when a response error occurs.
Range: 2–254. (Default: 3).
Not applicable to the "Modbus slave" protocol.

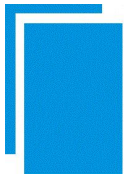
4.4.1.1 Node

The Configuration view supports three types of operations: Edit Menu, Edit Toolbar and Right-Click context Menu.

1. Add Node: Select the appropriate "Subnet" and add a new node. A new node named "Node-X" will be created under the Subnet.
The maximum number of nodes supported is 100.
2. Delete Node: Deleting a node will also remove all commands associated with that node.
3. Copy Node: Select an existing node and copy it. All commands under that node will be copied as well
4. Paste Node: Select the appropriate Subnet or an existing node, then paste the copied node.
The pasted node will retain all parameters from the original copied node.

The node is the Modbus slave address, which can range from 0 to 247. The node configuration interface is shown below:





4.4.1.2 Modbus Command

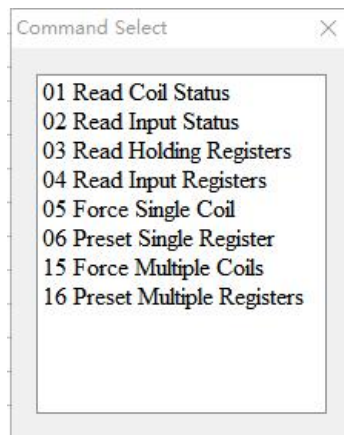
The Configuration view supports three types of operations: Edit Menu, Edit Toolbar and Right-Click context Menu.

1. Add Command: Select a node and add a new command.
A maximum of 100 commands is supported in total.
2. Delete Command: Select a command and delete it from the list.

The following Modbus function codes are supported: 01, 02, 03, 04, 05, 06, 15 and 16.

Double click a command to add it to the node:

The command interface is shown below:

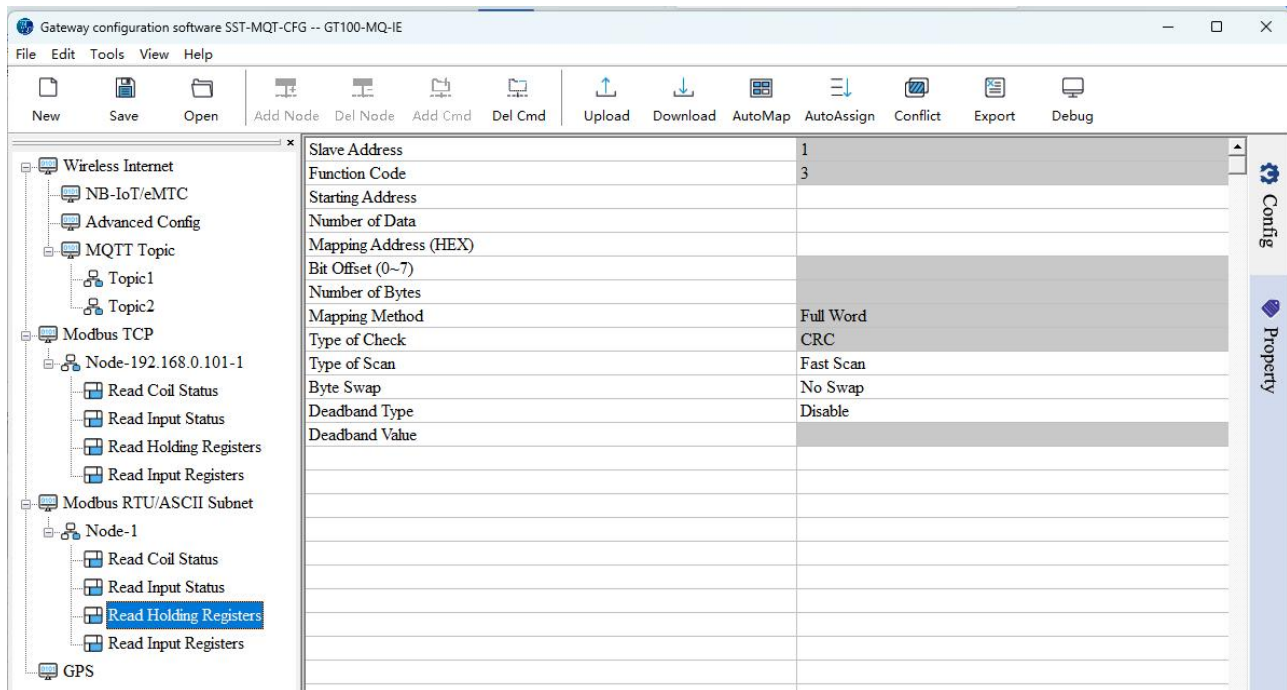


Note: For detailed information on configuring the Property fields, please refer to [Chapter 4.7.1 Property Configuration](#).

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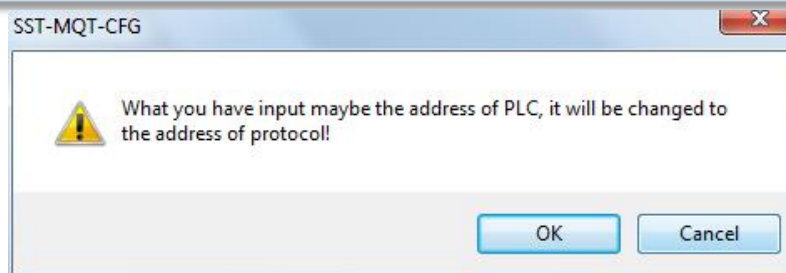


Slave Address: Modbus Slave address.

Function Code: Modbus Function Code.

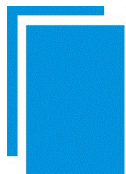
Starting Address: The starting address of status or register. Range: 0–65535.

Note: This address refers to the protocol address. When the user enters the PLC address, there will be a pop-up window asking for confirmation. Click "OK" to convert the input address into a protocol address. Click "Cancel" to refuse the converting.



Examples of PLC addresses and corresponding protocol addresses.

Block	PLC Address	Protocol Address
Coil Status	00001–00010	00000–00009
Input Status	10001–10010	00000–00009
Holding Register	40001–40010	00000–00009
Input Register	30001–30010	00000–00009



Number of Data: The number of data(registers or coils or status). The range is 1–122 (Modbus function code 3,4,16) or 1–244 (Modbus function code 1,2,15).

Mapping Address (HEX): The starting address of data in the buffer.

Read command: 0x0000–0x01FF.

Write command: 0x4000–0x41FF.

When users want to exchange the data between slave devices, the write command can be mapping in 0x0000–0x01FF.

Bit Offset (0-7): When reading/writing a coil or reading input status, its value will be mapped into bits of input or output buffer.

Number of Bytes: The number of the data bytes.

Mapping Method: Unused. Support only full-word mapping now. When reading or writing a register, you can map a full word into the buffer, or only map MS/LS byte into the buffer.

Type of Check: Data communication error check.

Type of Scan: Every Modbus command can be set to fast scan or slow scan. The gateway will send Modbus command according to the Scan Rate. Scan Rate is the ratio of fast-scan command to slow-scan command.

Byte Swap: There are three modes of Byte Swap: No Swap, Two Bytes Swap and Four Bytes Swap. It's valid for registers.

Two Bytes Swap: The high and low bytes of 2 bytes (one register) are exchanged, e.g. 0x1234 to 0x3412.

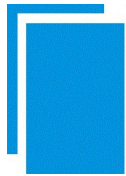
Four Bytes Swap: The first two bytes are exchanged with the last two bytes, e.g. 0x12345678 to 0x78563412.

Deadband Type: The deadband type defines the deadband behavior for this command. Available options: Enable or Disable (default: Disable).

Disable: No deadband is used.

Enable: Enable deadband. The absolute change in data required to be considered a data change.

Deadband Value: Sets the deadband value (range: 0.001-65535). This option is disabled when the deadband type is set to Disable.

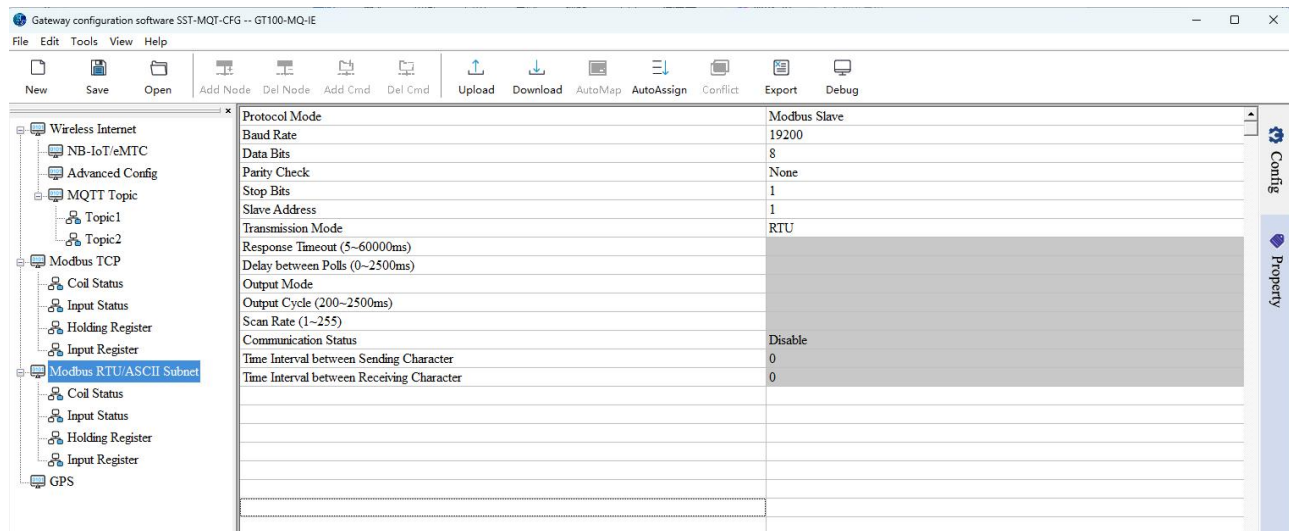


4.4.2 Modbus RTU/ASCII Slave Config

When the running mode is "Modbus TCP Server / Modbus Master/Slave", the GT100-MQ-IE enables the Modbus RTU/ASCII slave interface.

Refer to [4.4.1 Modbus RTU/ASCII Master Config](#) for parameter description on Modbus Slave interface.

Select a Status/Register block to enter Modbus slave block configuration window.



Coil/Input Status Starting Address: The start address of the 0/1XXXX area. The range is 0–65535, the default is 0.

Coil/Input Status Block Size: The block size of the 0/1XXXX area. The range is 0–512, and the default is 0.

Holding/Input Register Starting Address: The start address of the 4/3XXXX area. The range is 0–65535, and the default is 0.

Holding/Input Register Block Size: The block size of the 4/3XXXX area. The range is 0–256, and the default is 0.

For the setting description of Property, please refer to [4.7.1 Property Configuration](#).

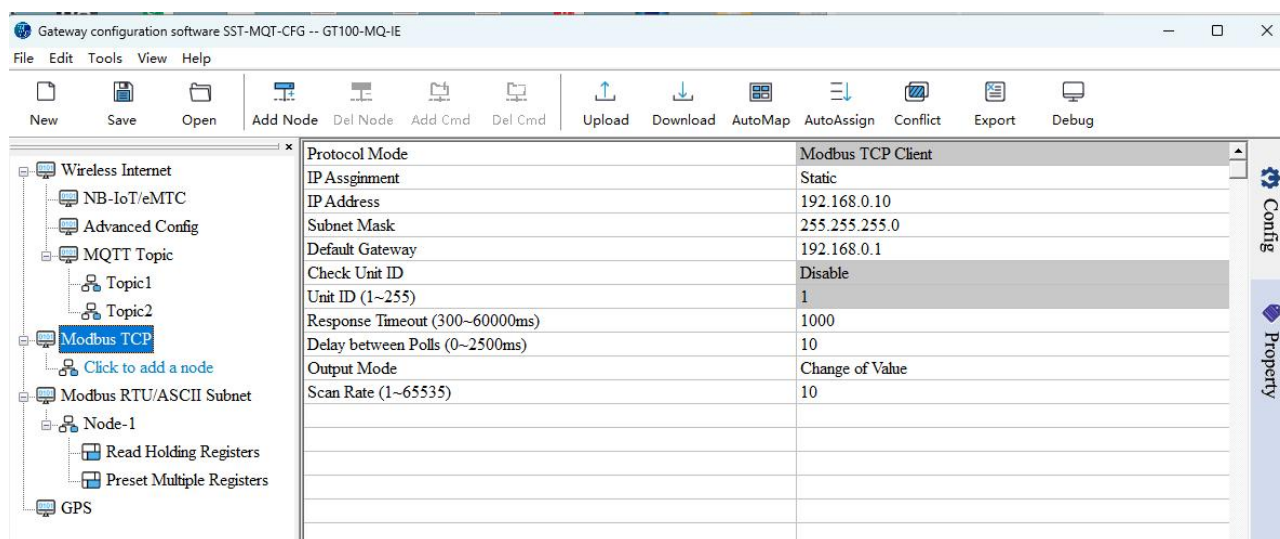


4.5 Modbus TCP Parameters

4.5.1 Modbus TCP Client Configuration

Double click on the SST-MQT-CFG icon ->GT100-MQ-IE ->Select Mode:Modbus TCP Client / Modbus Master:

Select the "Modbus TCP" in the left tree view to enter Modbus TCP interface configuration window.



Select Protocol: Modbus TCP Client. At this time, the gateway acts as a Modbus TCP client to connect to the Modbus TCP Server device.

Assign IP Mode: Supports Manually Assign / DHCP. In DHCP mode, the gateway need to connect to a DHCP server or switch to get valid IP address.

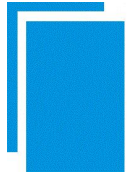
IP Address: IP Address of the GT100-MQ-IE. The device can be searched when the IP address is in the same network segment with the computer.

Whether you use this protocol or not, please assign an IP address to the gateway. Because the configuration software searches the gateway through the IP address for uploading/downloading configuration.

Subnet Mask: Subnet mask of the GT100-MQ-IE.

Default Gateway: Gateway address of the GT100-MQ-IE.

Response Timeout: Time to wait for response from Modbus TCP server after client sends a command. Range:



300ms–60000ms. The default value is 1000ms.

Delay between Polls: Delay time between the last response (or response timeout) and the new command. The actual delay time is the multiples of 10. Range: 0–2500 ms. If the input value is 9, the actual polling delay time is 0ms. If the input value is 15, the actual polling delay time is 10ms.

Output Mode: Three output modes: Cyclic, Forbidden, Change of Value.

Cyclic: The write command will be sent periodically.

Forbidden: The write command won't be sent.

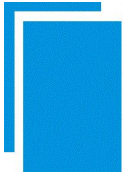
Change of Value: When the output data change, the write command will be sent.

Scan Rate: The ratio of fast-scan command to slow-scan command. If the value is set to 10, a slow-scan command will be sent once every ten fast-scan commands are sent. The range is 1 to 65535.

4.5.1.1 Node

- (1) Add node: Select the "Modbus TCP" and add a new node. A new node named "Node-X" will be added under the Subnet. The maximum number of nodes is 4.
- (2) Delete node: When deleting a node, all commands under the node will be deleted.
- (3) Copy node: Select an existing node and copy the node. The commands under the node will be copied at the same time.
- (4) Paste node: Select the Subnet or an existing node and paste the node. The pasted node has the same parameters with the copied node.

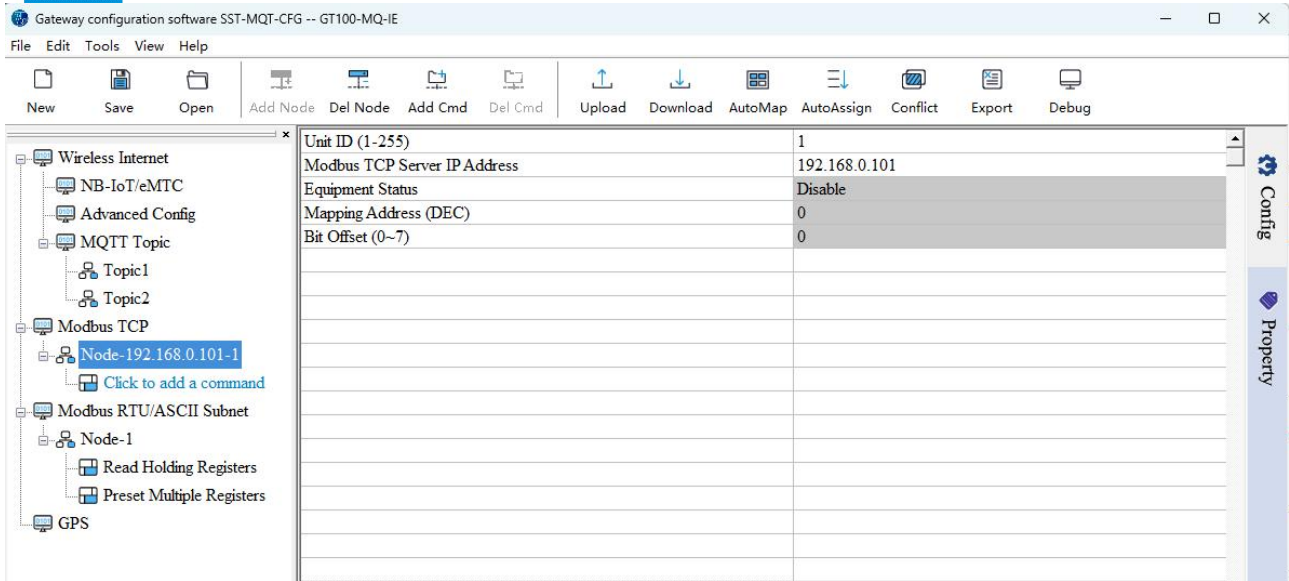
Select a node to enter the Modbus TCP client's node configuration window:



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Slave Address: Modbus Slave address. The range is 0 to 247. For a Modbus TCP server, it’s the Unit ID.

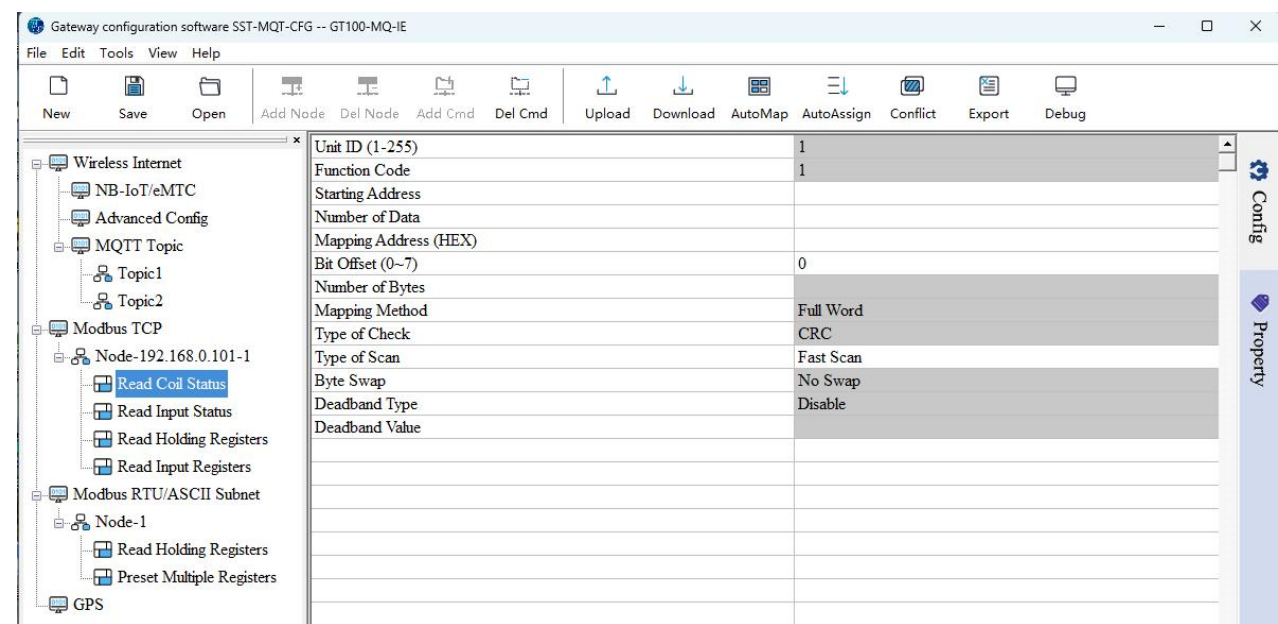
Modbus TCP Server IP address: When accessing the Modbus TCP Server at the same IP address, the slave address cannot be the same.

Equipment Status: Unused.

Mapping Address: Unused.

Bit Offset: Unused.

4.5.1.2 Modbus Command

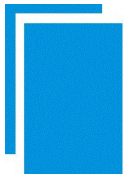


For the setting description of Modbus command, please refer to the "Modbus Command" section in the [4.4.1.2 Modbus Command](#).

For the setting description of Property, please refer to [4.7.1 Property Configuration](#).

4.5.2 Modbus TCP Server Configuration

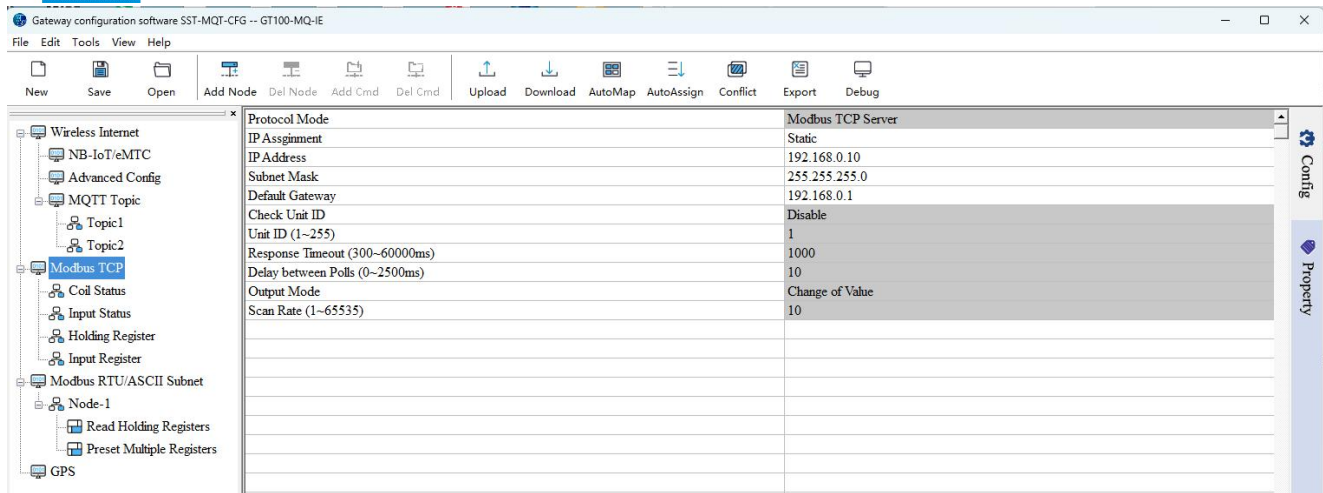
Double click on the SST-MQT-CFG icon ->GT100-MQ-IE ->Select Mode:Modbus TCP Server / Modbus Master/Slave:



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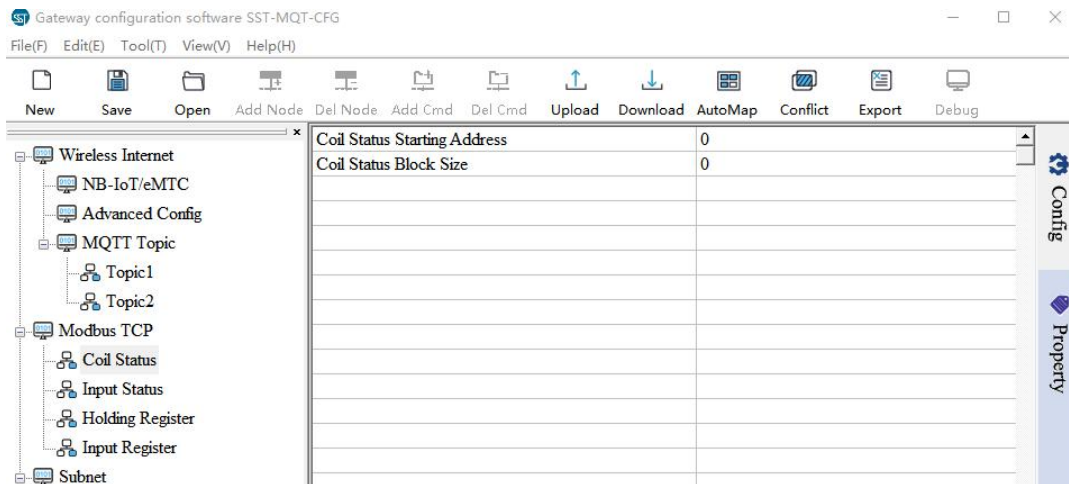
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Select Protocol: Modbus TCP Server. At this time, the gateway acts as a Modbus TCP server to connect to the Modbus TCP Client device.

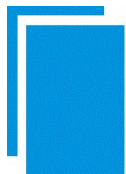
For descriptions of other parameters, please refer to [4.5.1 Modbus TCP Client Configuration](#).

Select a Status/Register block to enter Modbus TCP server block configuration window.



For the setting description of Status/Register block, please refer to [4.4.2 Modbus RTU/ASCII Slave Config](#).

For the setting description of Property, please refer to [4.7.1 Property Configuration](#).



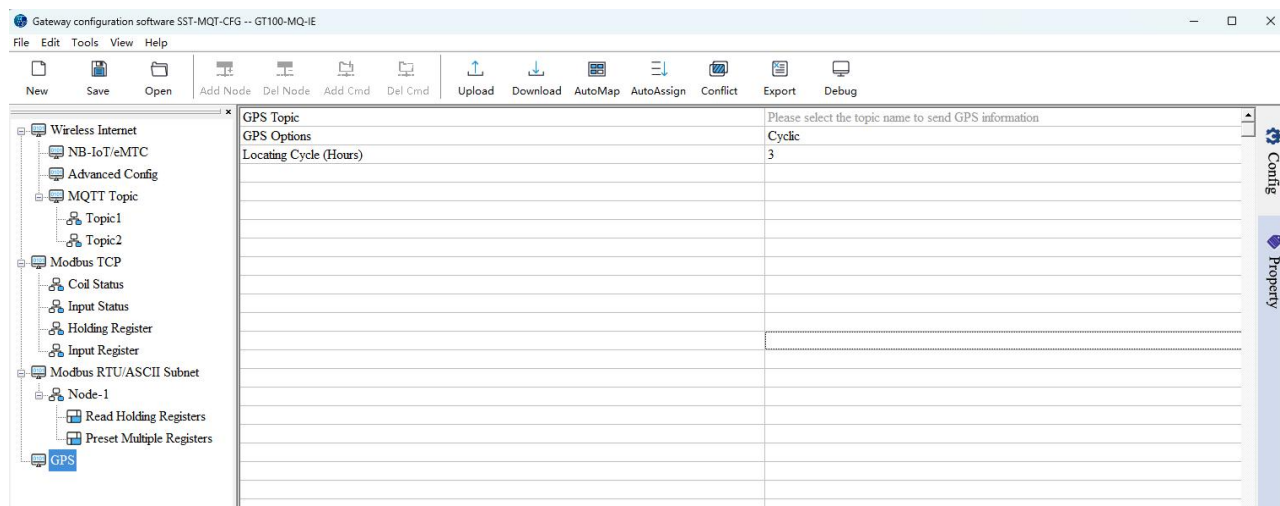
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4.6 GPS

Select the "GPS" in the left tree view to enter the GPS configuration window.



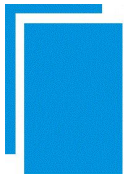
GPS Topic: Only "Publish" topic can be selected.

GPS Options: Two options: Disable, Cyclic.

This function is influenced by network quality. The data transmission may be slowed down when locating the device. It suggests to locate the device once at boot or set a large locating cycle.

Locating Cycle (Hours): The cycle time when locating the device. It is valid when the GPS Location Mode is "Cyclic". Range: 1–1000h. The default value is 3h.

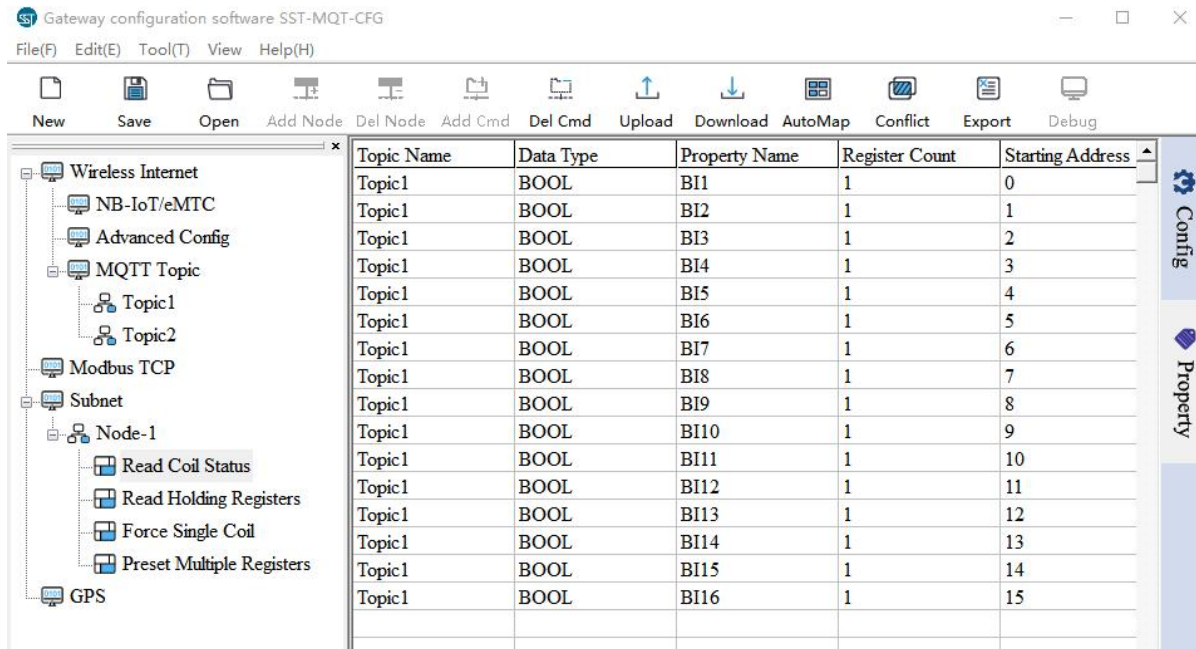
Note: The GPS positioning data sent by the device is WGS-84 coordinate system data.



4.7 Property Mapping

4.7.1 Property Configuration

Click "Property" in the right bar to enter the property window.



Topic Name: Select the topic for properties.

Data Type:

For command 1, 2, 5 and 15: The data type can be BOOL.

For command 3, 4, 6 and 16:

When using 1 register, the data type can be UINT/INT16.

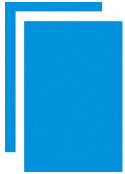
When using 2 registers, the data type can be UINT32/INT32/Float/UINT32V/INT32V/FloatV.

When using 4 registers, the data type can be UINT64/INT64/Double/UINT64V/INT64V/DoubleV.

"V" refers to exchange of the bytes.

For example: Float 12.56 corresponds to HEX F5 C3 41 48. FloatV 12.56 corresponds to HEX 41 48 F5 C3.

Double 3.38 corresponds to HEX D7 0A 70 A3 0A 3D 40 0B. DoubleV 3.38 corresponds to 40 0B 0A 3D 70 A3 D7 0A.



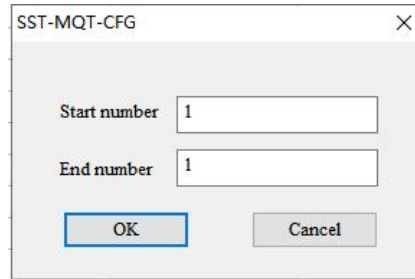
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Property Name: The property can be named automatically in orders or as custom names.

Copy Property Name: Click the right mouse button on any command option, and then select copy property name selection. Click the left mouse button, and fill in the start and end numbers of the properties to be copied in the prompt box.



Paste Property Name: Click the right mouse button on any command option, then select paste property name selection, fill in the prompt box to paste attribute name start number and end number to complete the paste attribute name.

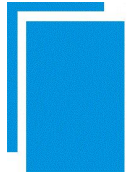
Copy scope = Paste scope.

Copy scope > Paste scope, modifications are subject to pasting.

Copy scope < Paste scope, modifications are subject to copying.

Register Count: The number of the register.

Starting Address: The starting address of data.



4.7.2 Name Properties in Order

Select "Tool" >> "Name Properties in Order" to use this function.

The "Name Properties in Order" function is to automatically sort the properties of one topic and name them in order, with no conflict.

4.7.3 Properties Name Conflict Detection

Select "Tool" >> "Properties Name Conflict Detection" to use this function.

The "Properties Name Conflict Detection" function is to automatically detect whether there are repeated property names in the same Topic and pop up the prompt.

4.7.4 AutoMap

Click "AutoMap" to automatically calculate the non-conflicting mapped memory address for each command.

4.7.5 Conflict Detection

To detect whether there are address conflicts in the mapping buffer. The configuration cannot be downloaded to the gateway if there are conflicts. This function is used for Modbus commands.

The mapping buffer is divided into input area and output area.

Input area address is from 0x0000 to 0x3FFF.

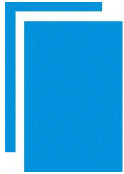
Output area address is from 0x4000 to 0x7FFF.

Each square represents a byte. The colors indicate the status of the address.

Green: No conflict of read commands in input area.

Yellow: The write commands are used to exchange data between slave devices and there is no conflict.

Blue: No conflict of write commands in output area.



GT100-MQ-IE

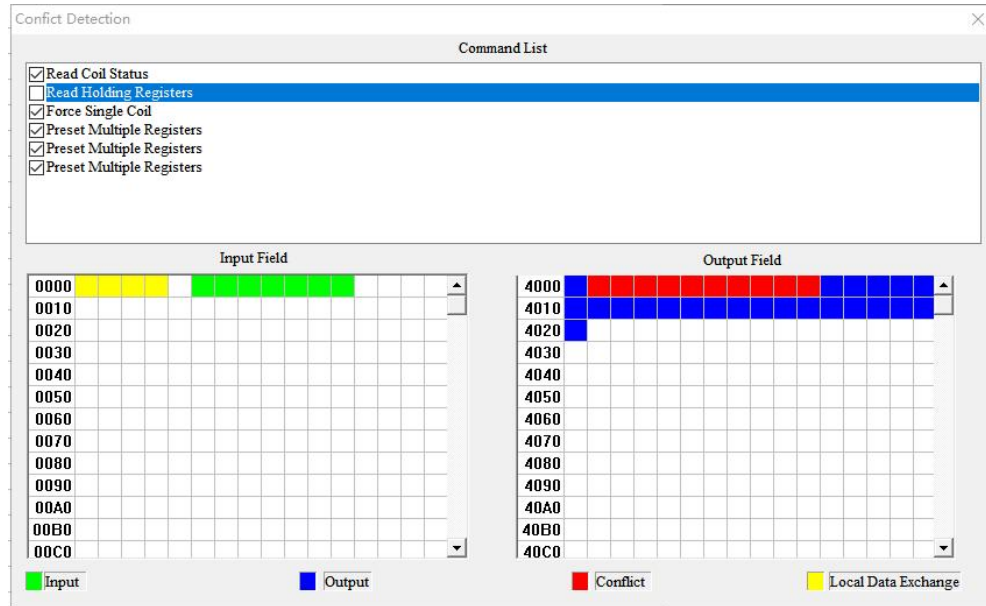
Modbus / Modbus TCP / MQTT Gateway

User Manual

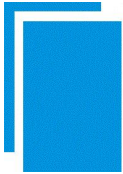
Red: Address conflicts.

White: None data is mapped in this address.

(1) Modbus TCP Server / Modbus Master/Slave



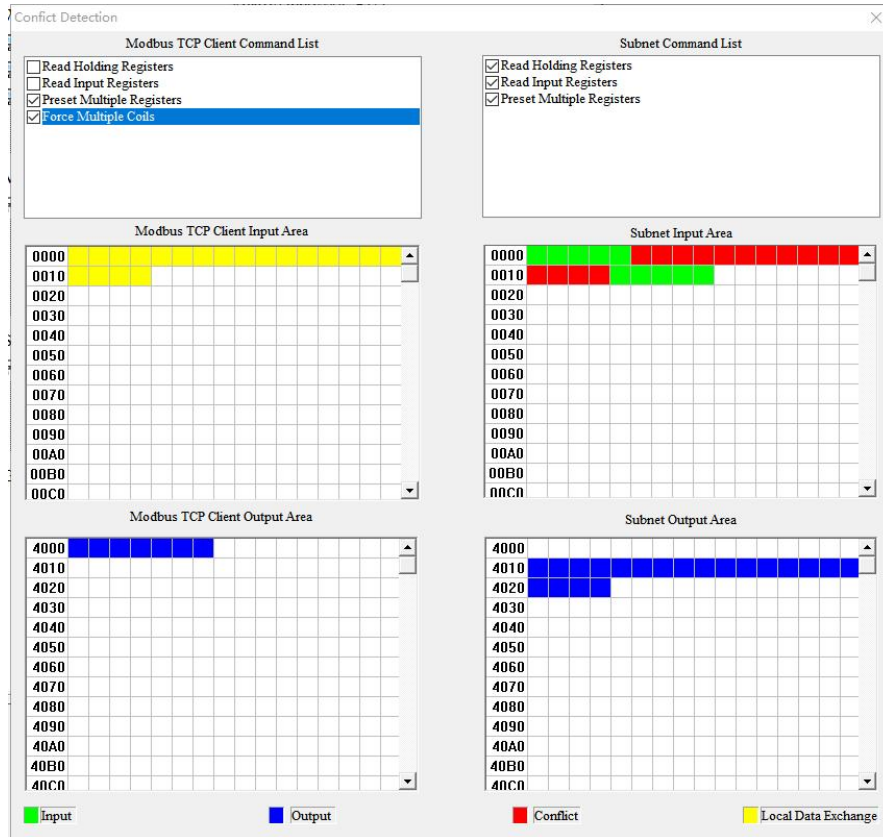
(2) Modbus TCP Client / Modbus Master



GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

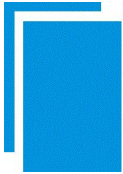
User Manual



4.8 Saving and Downloading Configuration

4.8.1 Search Device

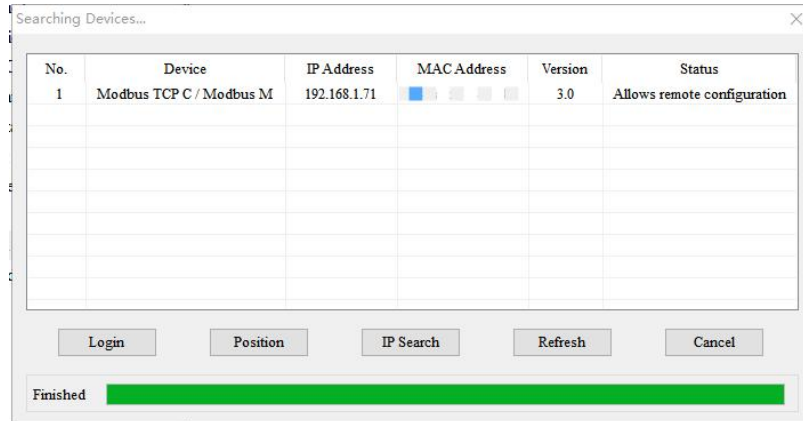
Click "Upload" or "Download" to open the search window. It will automatically search the available devices once after opening the search window.



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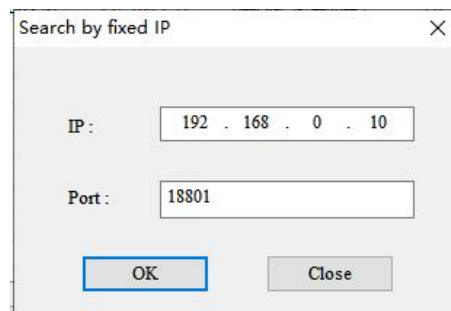
User Manual



Login: Select the device and click "Login" to upload / download the configuration.

Position: Select the device and click "Position", the ENS indicator on the selected gateway will turn red.

IP Search: Search the device in specific IP address and port.

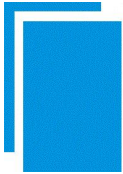


Refresh: Search the device again.

Cancel: Close the search window.

If the gateway cannot be detected, please refer to the following troubleshooting steps:

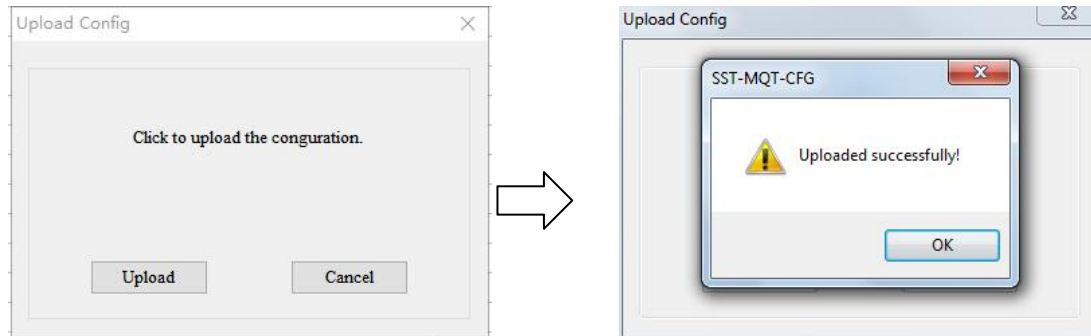
1. Make sure that the GT100-MQ-IE and your computer are in the same network segment.
2. If you can't discover any gateways, please test the network connection first. Please refer to the note "[How to Use the Ping Command](#)" located on our Support page on the sstautomation.com website.
3. If the Assign IP mode is DHCP, and there is no DHCP Server or you can't search the GT100-MQ-IE. Please power on, then press and hold the button for 3 seconds. At this time, the IP address is restored to 192.168.0.10, and the device can be searched under the same network segment as the gateway and computer, and the configuration can be uploaded and downloaded.



4.8.2 Upload

Select "Upload" to upload the gateway configuration information from the device to the software.

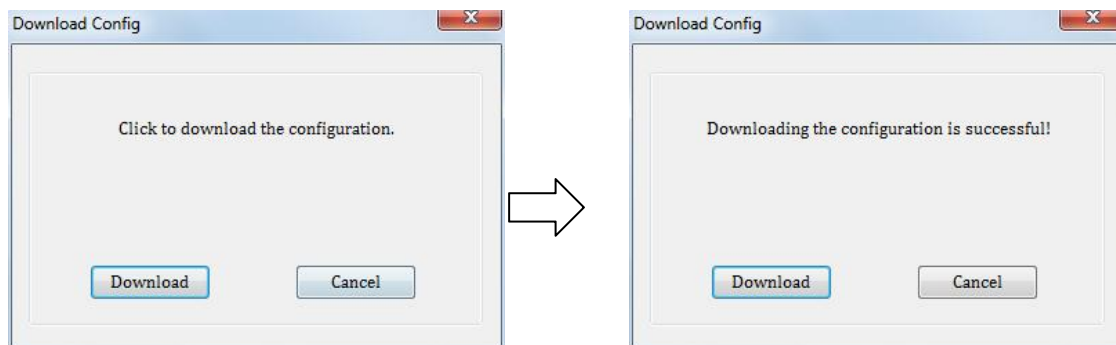
When uploading the configuration from the gateway to the software, the pop-up window is as below:



4.8.3 Download

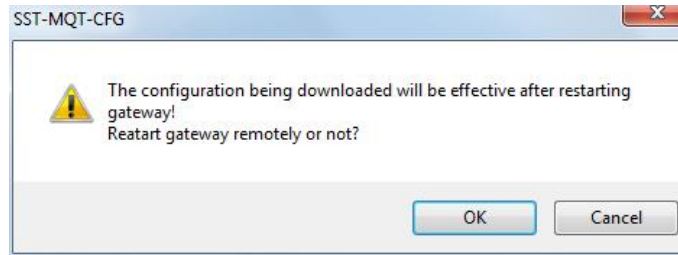
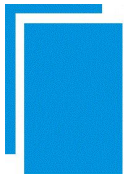
Select "Download" to download the configured gateway information to the gateway device.

When downloading the configuration to the gateway, the pop-up window is as below:



Click "Cancel" and the pop-up window will ask for remote restart. The new configuration is effective after restarting.

Click "OK" to restart the gateway. Click "Cancel" to refuse to restart.

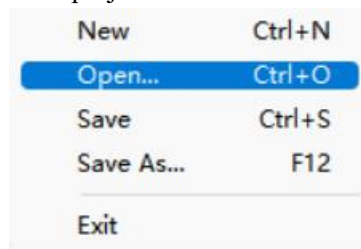


Note: If Modbus TCP Assign IP Mode is set to DHCP, the following dialog box is displayed.



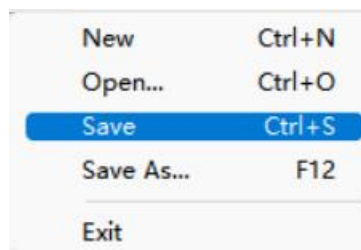
4.8.4 Open Configuration Project

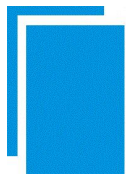
Select "Open" to open an existing configuration project:



4.8.5 Save Configuration Project

Select "Save" or "Save As..." to save the configuration project as a .json file.



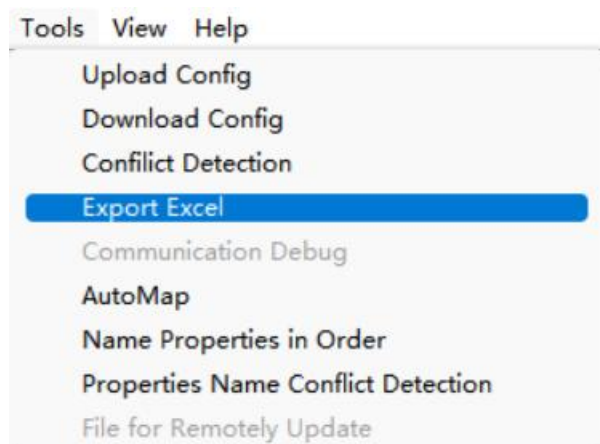


4.9 Other

4.9.1 Export Excel

The configuration can be exported as a table.

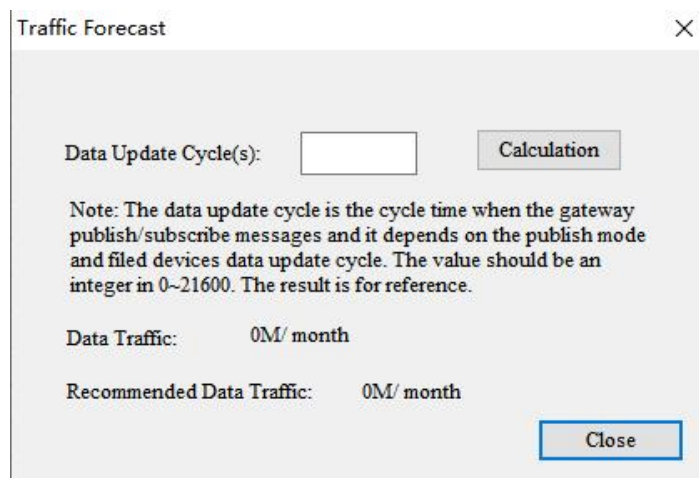
Please confirm that Microsoft Excel is installed on your computer before using this function.



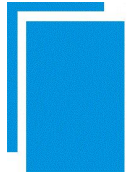
4.9.2 Traffic Forecast

The Traffic Forecast function is to calculate the data traffic within 1 month (30 days).

Select "Tool" >> "Traffic Forecast" to open the calculate window.



Data Update Cycle(s): It's the cycle time when the gateway publish/subscribe messages. It depends on the Publish



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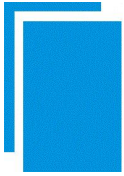
User Manual

Mode and field devices data update cycle. The value should be an integer in 0–21600. When the Publish Mode is "Cyclic", the Data Update Cycle is the Sending Cycle time.

Data Traffic: The expected data traffic in 1 month.

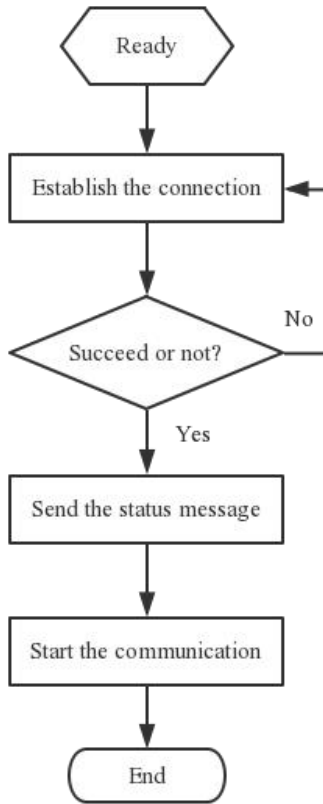
Recommended Data Traffic: The recommended data plan.

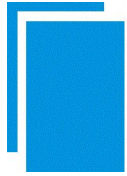
Note: The result is for reference.



5 Working Principle

5.1 Connection Process





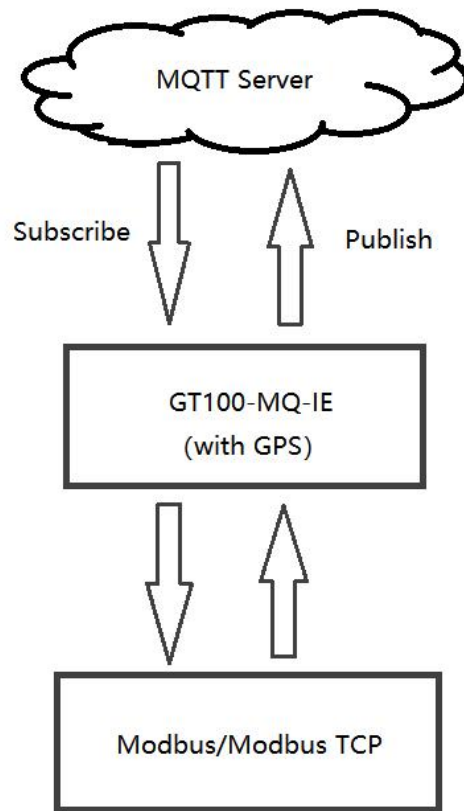
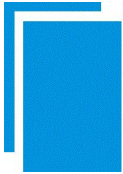
5.2 Data Exchange

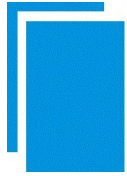
The GT100-MQ-IE is able to connect Modbus RTU/ASCII and Modbus TCP devices to MQTT Servers, such as Amazon AWS IoT, Microsoft Azure IoT and customized Servers.

Based on the configured mapping between Modbus data points and attribute names, the device will periodically package data with their corresponding attributes into a specific JSON structure and publish it to the MQTT Broker.

Alternatively, when configured for change-only reporting, it will transmit only modified data. The transmission behavior is governed by the Publish Mode setting.

The device can also receive configuration updates through its subscribed topic. When JSON-formatted data is published to this topic, the device validates the format and processes valid messages by matching attribute names to their corresponding values and applying the specified changes.





Appendix A: MQTT Message Format

A.1 Default Format

A.1.1 Publish Message

Note: "//" indicates the comments part.

GPS: *//Global Positioning System*

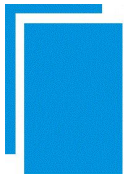
```
{  
  "version":   "1.1.1.0",  
  "GPS":{  
    "Latitude": 31.057020,  
    "Longitude": 121.189590  
  }  
}
```

Read Coil Status / Input Status:

```
{  
  "version":   "1.1.1.0",           //Version information  
  "time":     "19/03/07,17:04:07",  //Time stamp  
  "properties":{  
    //When publishing messages in property type, the GT100-MQ-IE can publish 8 properties at most in one message.  
    If more than 8 properties need to be transmitted, the GT100-MQ-IE will publish multiple messages of 8 or less  
    properties.  
    "BI3":    false,  
    "BI4":    true,  
    "BI5":    false,  
    "BI6":    false  
  }  
}
```

Read Holding Register / Input Register:

```
{  
  "version":   "1.1.1.0",  
  "time":     "19/03/07,17:10:03",
```



```
"properties":{  
  "AI2": 999999.500000, //The data type (for example, Float) consists with the property configuration  
  "AI3": 888888.500000,  
  "AI4": 777777.500000,  
  "AI5": 666666.500000  
}  
}
```

A.1.2 Subscribe Message

Note: "/" indicates the comments part.

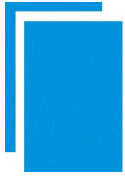
Modbus Master/Slave / Modbus TCP Server

Change Coil/Input Status:

```
{  
  "properties": {  
    "BO3": false,  
    "BO4": true,  
    "BO5": false  
  }  
}
```

Change Holding/Input Register:

```
{  
  "properties": {  
    "AO3": 123.5,  
    "AO4": 321.5,  
    "AO5": 555.6  
  }  
}
```



A.2 Custom Message Format (The configuration applies only to the published data format)

```
{
  "timestamp": |TIMESTAMP|,
  "values": {
    |#each VALUES|
    "name": "|PROPERTIESNAME|", "v": |VALUE||#unless @last|,/unless|
  |each|
  }
}
```

(1) Variable description

|PROPERTIESNAME|: Property Name. For example, AI1.

|VALUE|: The value of the property.

|TIMESTAMP|: The time when the property was read.

(2) Grammar

```
|#each VALUES|
  |PROPERTIESNAME|, |VALUE|, |TIMESTAMP|,
|each|
```

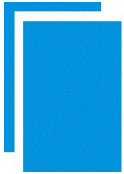
The "each" is to generate text for each property. Users just need to edit one single property template between "|#each VALUES|" and "|/each|" and it will be copied to every property. Up to 8 properties can be published in one message.

Template example:

```
{
  |#each VALUES|
    "|PROPERTIESNAME|_value": |VALUE|,
    "|PROPERTIESNAME|_timestamp": |TIMESTAMP|,
  |each|
}
```

Message example:

```
{
```

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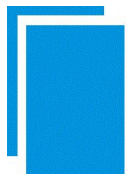
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```
"AI1_value": 23,  
"AI1_timestamp": 1456150184825,  
"AI2_value": 17,  
"AI2_timestamp": 1456150184984,  
...  
}
```

(3) Additional grammar description:

|#unless @last|,/unless|

This line means "Must insert a comma at the end of each line, unless it's the last line". It cancels the comma in the last line. If users regard the comma in the last line as a syntax error, the template must contain this line.



Appendix B: Change Product Firmware Mode

The GT100-MQ-IE integrates two [Firmware modes](#) A and B, switched by downloading the BIN file.

Preparation:

Tools: Web browser

Connect cables: Network cable

Bin file: Please go to the installation directory of the configuration software SST-MQT-CFG to obtain the bin file.

✧ Path example:

C:\Program Files\SST Automation\SST-MQT-CFG V4.4.8\gt100-mq-ie-bin

✧ Bin file example:

Modbus TCP C -Modbus M (GT100-MQ-IE-A)-F3.4.4.2.bin

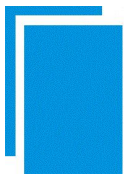
Modbus TCP S-Modbus MS (GT100-MQ-IE-B)-F3.4.4.0.bin

See the following for specific operation steps.

1. Change the IP address of PC as fixed 192.168.0.xxx.
2. Hold the button on the GT100-MQ-IE and power it on. The ENS and TX / RX LED will blink green, that indicates the GT100-MQ-IE is ready to update the firmware. Then release the button.
3. Enter 192.168.0.10 in your web browser to enter SST Automation Product Firmware Update Platform. Login with the following information:

Username: user

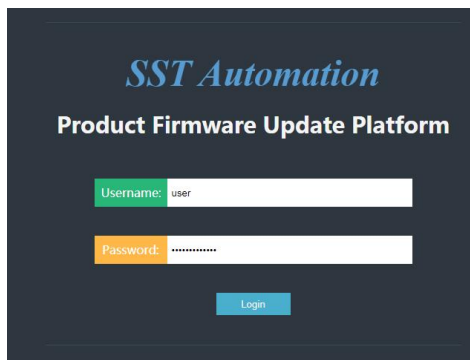
Password: sstautomation



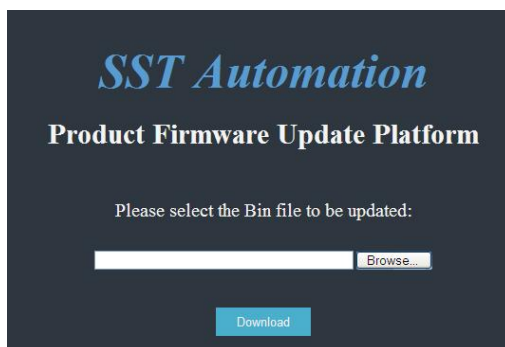
GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

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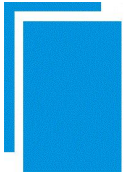
4. Click "Browse..." to select a Bin file. The Bin files are located in the installation path of the SST-MQT-CFG software.



5. Click "Download" to download the specified firmware into the GT100-MQ-IE.



6. After download, it shows the firmware update is successful. Click "Reboot" to restart the GT100-MQ-IE.

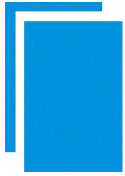


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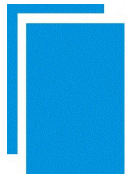




GT100-MQ-IE
Modbus / Modbus TCP / MQTT Gateway
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7. Wait for the GT100-MQ-IE to restart.





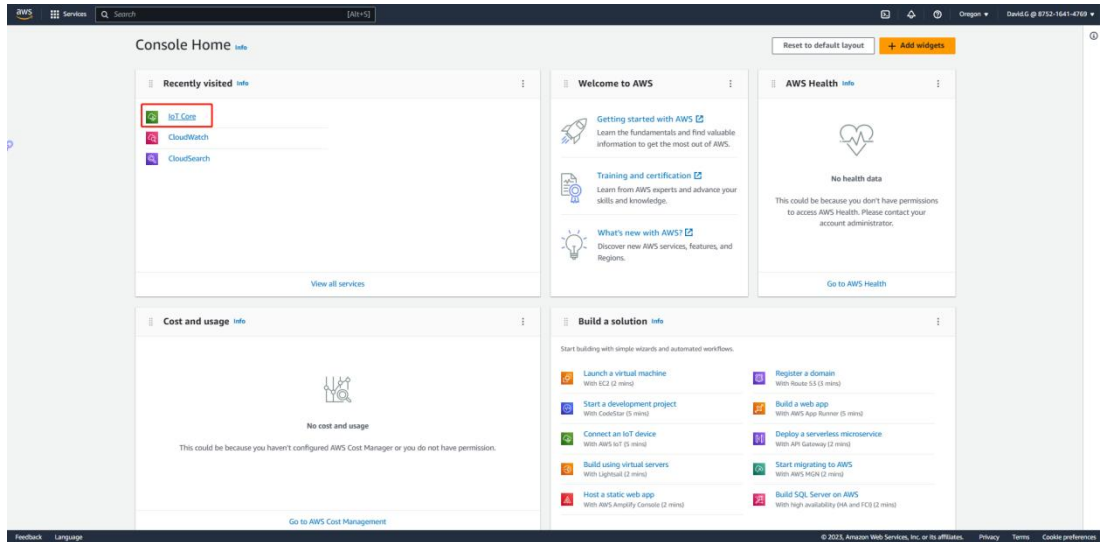
GT100-MQ-IE

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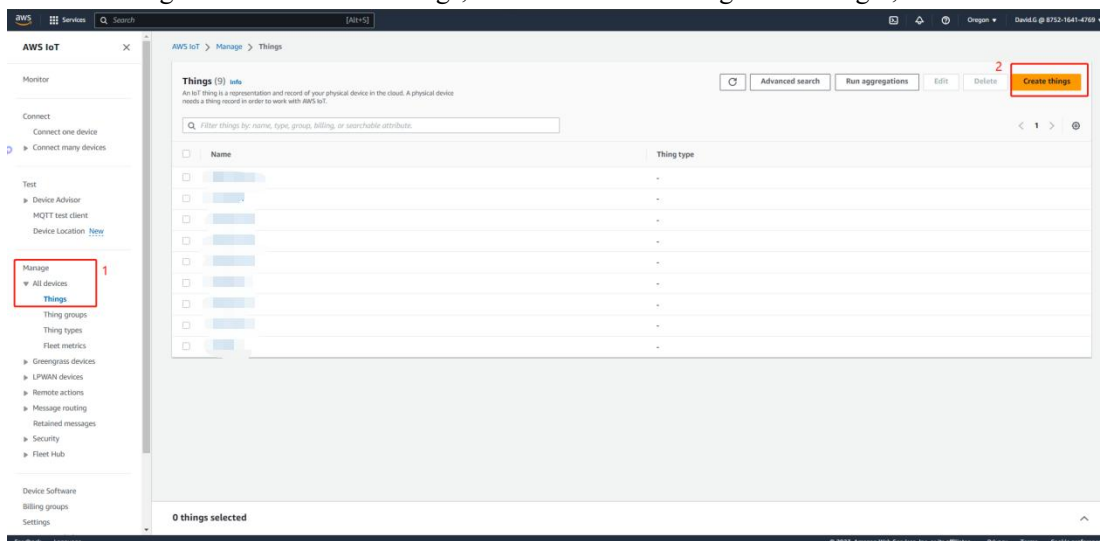
User Manual

Appendix C: GT100-MQ-IE Connection AWS IoT Application Notes

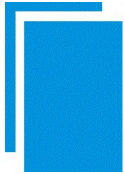
Log in to the AWS homepage and click IoTCore:



Click Manage -> All Devices -> Things, and click "Create things" on the right,



Select to Create single thing, click Next,



GT100-MQ-IE

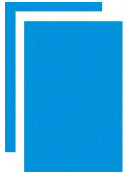
Modbus / Modbus TCP / MQTT Gateway

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The screenshot shows the AWS IoT console interface. On the left is a navigation menu with sections: Monitor, Connect (with sub-items 'Connect one device' and 'Connect many devices'), Test (with sub-items 'Device Advisor', 'MQTT test client', and 'Device Location'), and Manage (with sub-items 'All devices', 'Things', 'Thing groups', 'Thing types', 'Fleet metrics', 'Greengrass devices', 'LPWAN devices', 'Remote actions', 'Message routing', and 'Retained messages'). The main content area is titled 'Create things' and includes a description: 'A thing resource is a digital representation of a physical device or logical entity in AWS IoT. Your device or entity needs a thing resource in the registry to use AWS IoT features such as Device Shadows, events, jobs, and device management features.' Below this is a section 'Number of things to create' with two radio button options: 'Create single thing' (selected) and 'Create many things'. At the bottom right are 'Cancel' and 'Next' buttons.

Enter Thing name and click Next,

The screenshot shows the 'Specify thing properties' step in the AWS IoT console. The left navigation menu is the same as in the previous screenshot. The main content area is titled 'Specify thing properties' and includes a description: 'A thing resource is a digital representation of a physical device or logical entity in AWS IoT. Your device or entity needs a thing resource in the registry to use AWS IoT features such as Device Shadows, events, jobs, and device management features.' Below this is a section 'Thing properties' with a 'Thing name' input field containing 'DavidG-test01'. A red box highlights this input field. Below the input field is a note: 'Enter a unique name containing only: letters, numbers, hyphens, colons, or underscores. A thing name can't contain any spaces.' Below this is a section 'Additional configurations' with four expandable options: 'Thing type - optional', 'Searchable thing attributes - optional', 'Thing groups - optional', and 'Billing group - optional'. Below this is a section 'Device Shadow' with three radio button options: 'No shadow' (selected), 'Named shadow', and 'Unnamed shadow (classic)'. At the bottom right are 'Cancel' and 'Next' buttons, with the 'Next' button highlighted by a red box.



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Modbus / Modbus TCP / MQTT Gateway

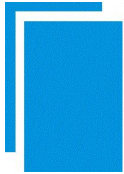
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Select Auto-generate a new certificate and click Next,

The screenshot shows the AWS IoT console interface. On the left is a navigation menu with sections like Monitor, Connect, Test, and Manage. The main content area is titled 'Configure device certificate - optional' and includes a description of device certificates. Under the 'Device certificate' section, four radio button options are listed: 'Auto-generate a new certificate (recommended)', 'Use my certificate', 'Upload CSR', and 'Skip creating a certificate at this time'. The first option is selected and highlighted with a red rectangular box. At the bottom right of the main content area, there are three buttons: 'Cancel', 'Previous', and 'Next'. The 'Next' button is highlighted with a red rectangular box.

A certificate attachment policy that determines the permissions for subscription and publication,

The screenshot shows the AWS IoT console interface at the 'Attach policies to certificate' step. The main content area is titled 'Attach policies to certificate - optional' and includes a description of attaching policies. Below this, there is a section 'Policies (1/5)' with a search bar and a table of policies. The first policy, named 'test', is selected with a checkbox and highlighted with a red rectangular box. At the bottom right of the main content area, there are three buttons: 'Cancel', 'Previous', and 'Create thing'. The 'Create thing' button is highlighted with a red rectangular box.



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Download the four certificates in the following figure,

Download certificates and keys

Download certificate and key files to install on your device so that it can connect to AWS.

Device certificate

You can activate the certificate now, or later. The certificate must be active for a device to connect to AWS IoT.

Device certificate

7c374077732...te.pem.crt

Deactivate certificate

Download

Key files

The key files are unique to this certificate and can't be downloaded after you leave this page. Download them now and save them in a secure place.

This is the only time you can download the key files for this certificate.

Public key file

7c374077732e67481e46cdf...c5558b3-public.pem.key

Download

Private key file

7c374077732e67481e46cdf...5558b3-private.pem.key

Download

Root CA certificates

Download the root CA certificate file that corresponds to the type of data endpoint and cipher suite you're using. You can also download the root CA certificates later.

Amazon trust services endpoint

RSA 2048 bit key: Amazon Root CA 1

Download

Amazon trust services endpoint

ECC 256 bit key: Amazon Root CA 3

Download

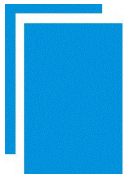
If you don't see the root CA certificate that you need here, AWS IoT supports additional root CA certificates. These root CA certificates and others are available in our developer guides. [Learn more](#)

Done

After completing these, Thing is successfully created.

www.SSTAutomation.com

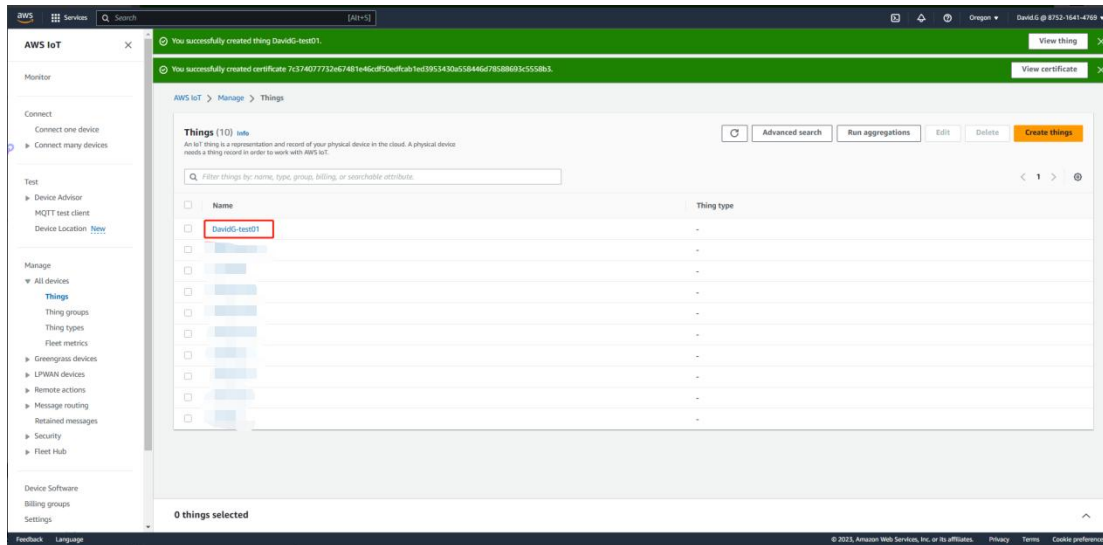
68



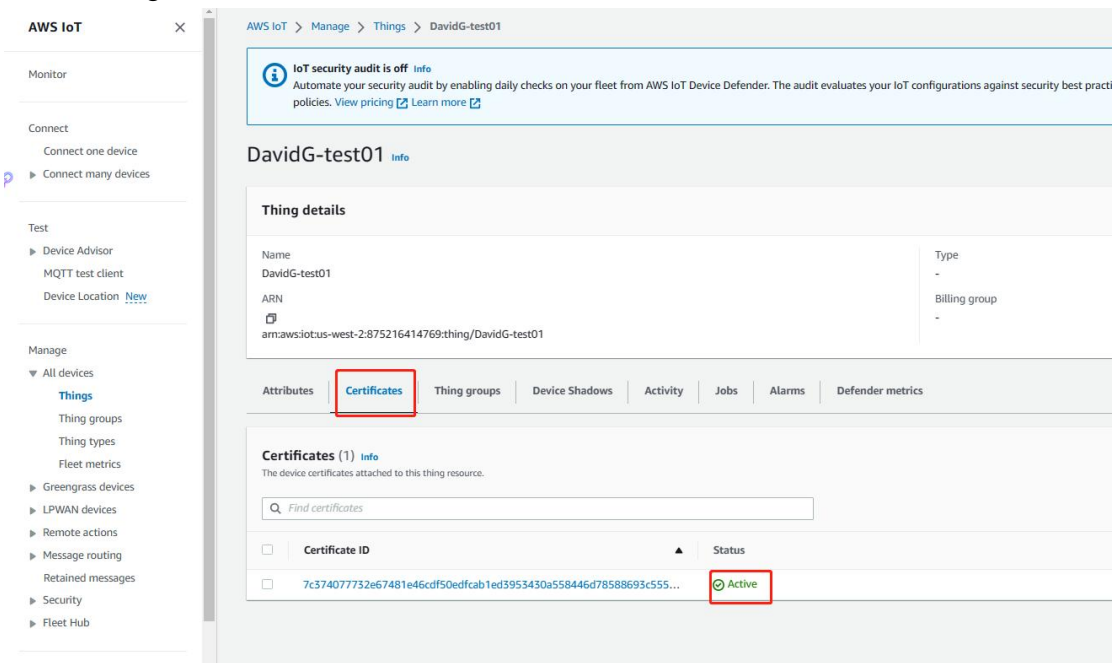
GT100-MQ-IE

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After clicking on the device, confirm whether the certificate has been activated in Certificates,

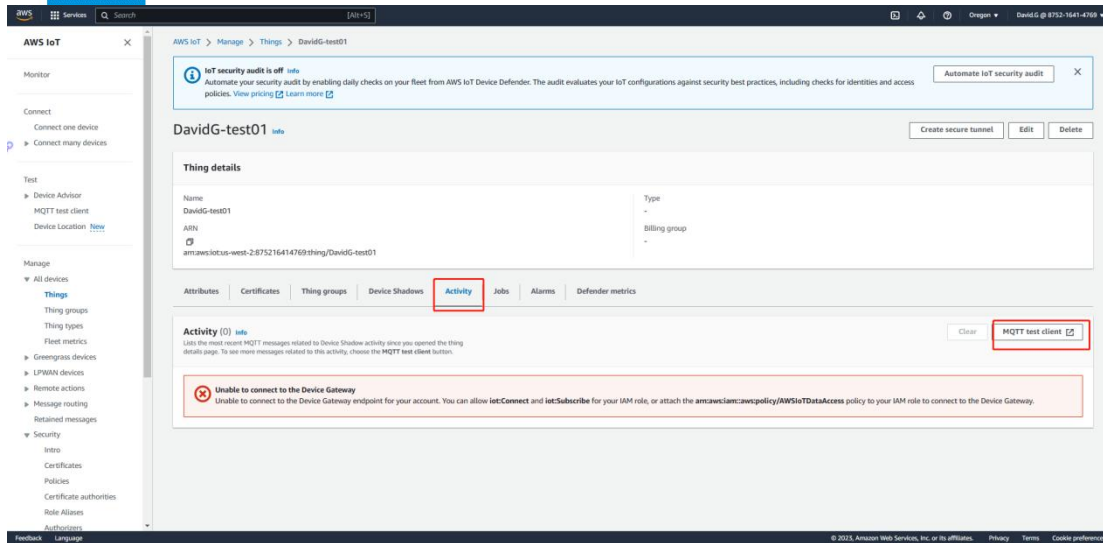


Select the Activity and click to enter the MQTT test client,

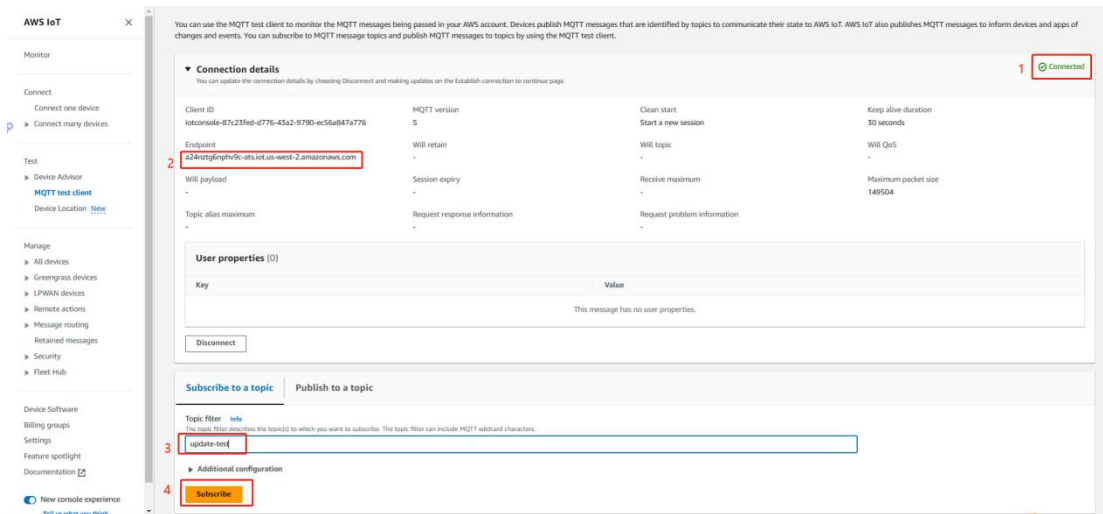
GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

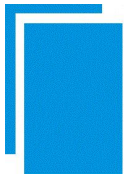
User Manual



1. Confirm whether the connection is successful
2. Copy the URL in the endpoint to SST-MQT-CFG
3. Configure the topic to subscribe to, and the topic name must be consistent with that in SST-MQT-CFG
4. Click to subscribe



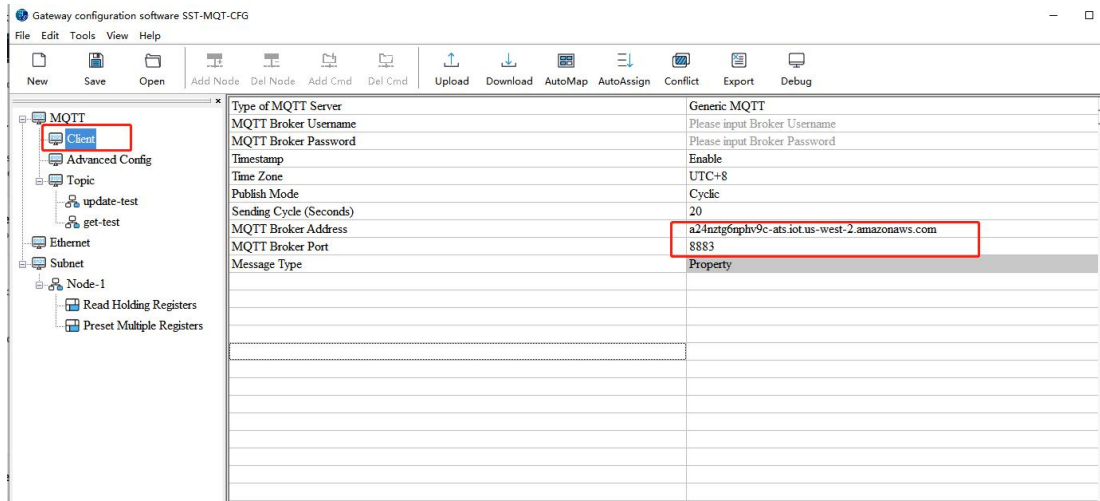
配置 SST-MQT-CFG 中的 Broker address，以及端口号 8883，



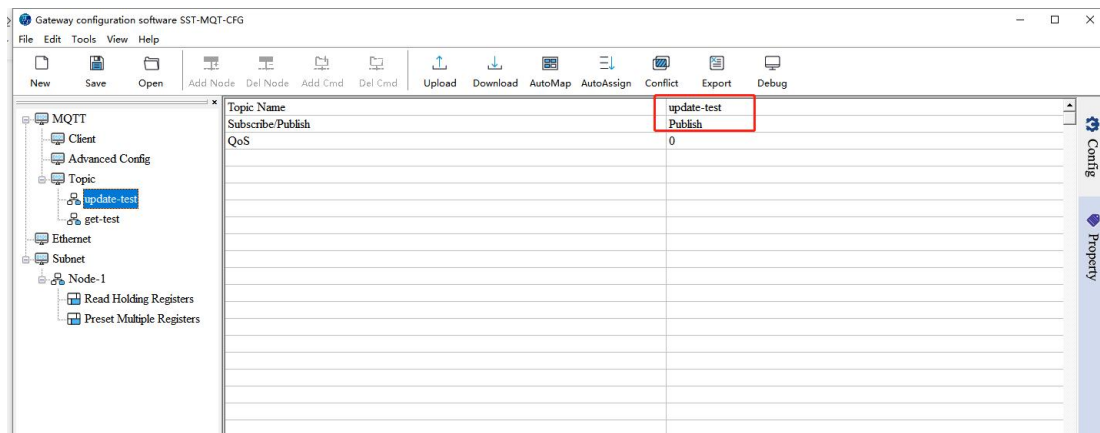
GT100-MQ-IE

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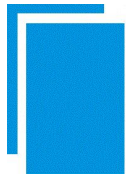


Configure topic name and publish permissions



Select the certificate file, download the configuration, and restart the device

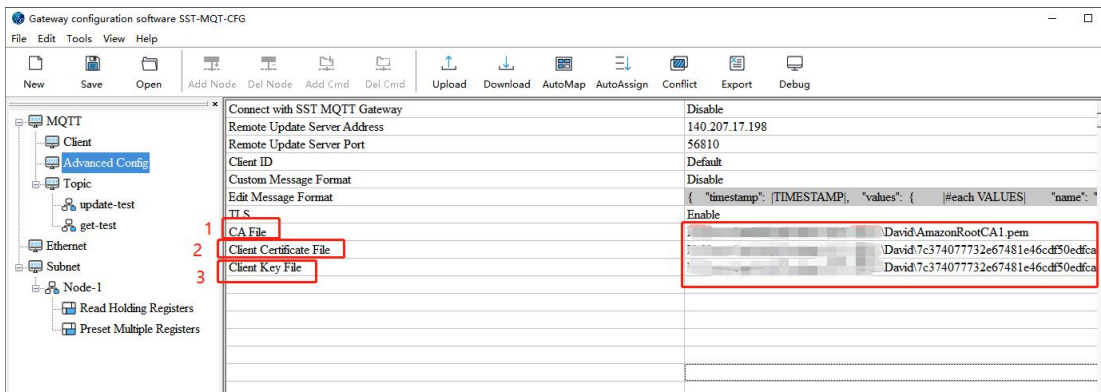
1. AmazonRootCA1.pem
2. 7c374077732e67481e46cdf50edfcab1ed3953430a558446d78588693c5558b3-certificate.pem.crt
3. 7c374077732e67481e46cdf50edfcab1ed3953430a558446d78588693c5558b3-private.pem.key



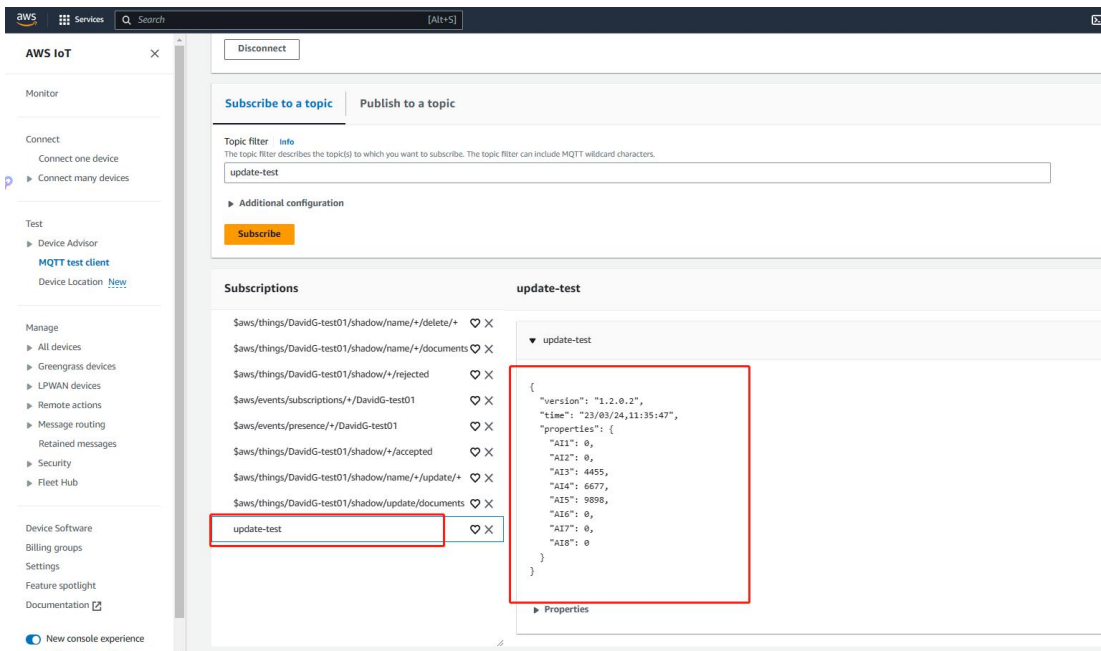
GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

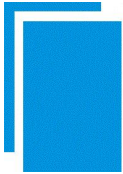
User Manual



Once your device reboots and connects to AWS, if it's set to send data at regular intervals, just wait for the device to hit its scheduled data transmission period, and then you can view all the data it sends on the AWS IoT Core.



AWS IoT Core supports publishing data to devices. You need to configure topic in SST-MQT-CFG and have subscribe permission:



GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

User Manual

AWS IoT

×

Monitor

Connect

Connect one device

Connect many devices

Test

Device Advisor

MQTT test client

Device Location

Manage

All devices

Greengrass devices

LPWAN devices

Remote actions

Message routing

Retained messages

Security

Fleet Hub

Device Software

Billing groups

AWS IoT > MQTT test client

MQTT test client

You can use the MQTT test client to monitor the MQTT messages being passed in your AWS account. Devices publish MQTT messages that are identified by changes and events. You can subscribe to MQTT message topics and publish MQTT messages to topics by using the MQTT test client.

Connection details

You can update the connection details by choosing Disconnect and making updates on the Establish connection to continue page.

Subscribe to a topic

Publish to a topic

Topic name

This topic name identifies the message. The message payload will be published to this topic with a Quality of Service (QoS) of 0.

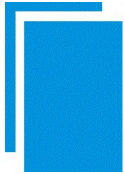
get-test

Message payload

{
 "properties":{
 "AO3": 1122,
 "AO4": 3344,
 "AO5": 5566
 }
}

Additional configuration

Publish



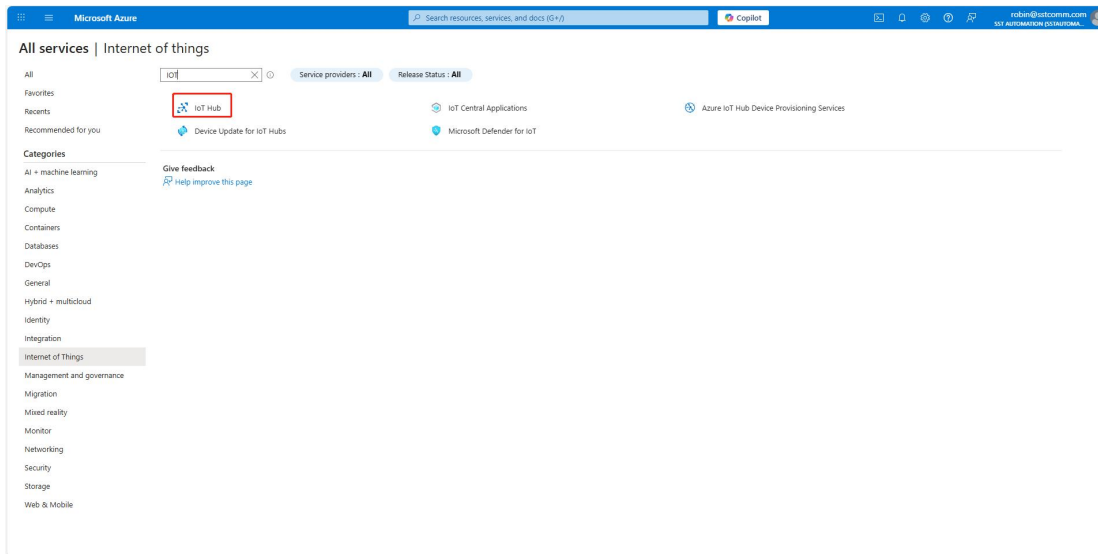
GT100-MQ-IE

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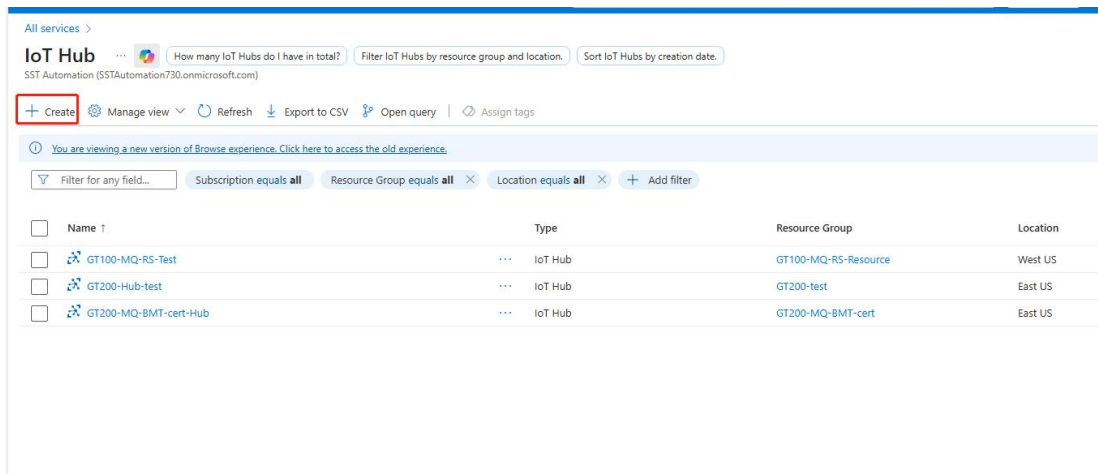
User Manual

Appendix D: Connecting via Azure IoT Self-Signed Certificate Method Application Notes

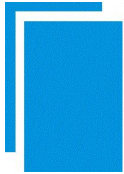
Log in to the Azure homepage and click IoT Hub:



Click "Create" and fill in the relevant information to set up your IoT Hub device:



This application note demonstrates how to connect to Azure IoT using X.509 certificates. To begin, you need to



GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

User Manual

register the certificates.

You can download and install the OpenSSL tool to generate the certificates:

<https://slproweb.com/products/Win32OpenSSL.html>

acquire in bacon fat before delivery to your company's machines.

"We would like to transfer a donation to Win32 OpenSSL, but only without Paypal. Can we transfer directly? Please send me the bank details with a quote." My bank account is 000012345 and my routing number is 000012345. I look forward to your donation. Huh...that's amazing! I've got the same combination on my luggage!

Win32/Win64 OpenSSL Screenshots



Screenshot of the Win32/Win64 OpenSSL Installer

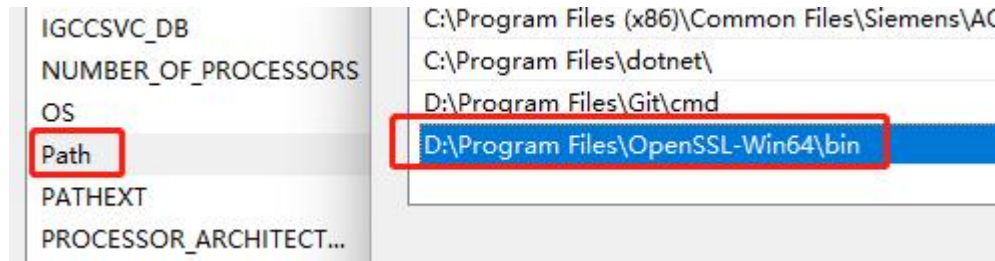
Download Win32/Win64 OpenSSL

Download Win32/Win64 OpenSSL today using the links below!

File	Type	Description
Win64 OpenSSL v3.6.0 Light EXE MSI	6MB Installer	Installs the most commonly used essentials of Win64 OpenSSL v3.6.0 (Recommended for users by the creators of OpenSSL). Only installs on 64-bit versions of Windows and targets Intel x64 chips. Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
Win64 OpenSSL v3.6.0 EXE MSI	240MB Installer	Installs Win64 OpenSSL v3.6.0 (Recommended for software developers by the creators of OpenSSL). Only installs on 64-bit versions of Windows and targets Intel x64 chips. Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
Win32 OpenSSL v3.6.0 Light EXE MSI	3MB Installer	Installs the most commonly used essentials of Win32 OpenSSL v3.6.0 (Only install this if you need 32-bit OpenSSL for Windows). Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
Win32 OpenSSL v3.6.0 EXE MSI	207MB Installer	Installs Win32 OpenSSL v3.6.0 (Only install this if you need 32-bit OpenSSL for Windows). Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
Win64 OpenSSL v3.6.0 Light for ARM (EXPERIMENTAL) EXE MSI	6MB Installer	Installs the most commonly used essentials of Win64 OpenSSL v3.6.0 for ARM64 devices (Only install this VERY EXPERIMENTAL build if you want to try 64-bit OpenSSL for Windows on ARM processors). Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
Win64 OpenSSL v3.6.0 for ARM (EXPERIMENTAL) EXE MSI	207MB Installer	Installs Win64 OpenSSL v3.6.0 for ARM64 devices (Only install this VERY EXPERIMENTAL build if you want to try 64-bit OpenSSL for Windows on ARM processors). Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
WinUniversal OpenSSL v3.6.0 Light for all architectures (EXPERIMENTAL) EXE	15MB Installer	Installs the most commonly used essentials of WinUniversal OpenSSL v3.6.0 for all devices (Only install this EXPERIMENTAL build if you need universal Windows binaries of OpenSSL for Windows for all architectures - Intel x86, Intel x64, and ARM - includes static binaries and a portable installer variant). Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
WinUniversal OpenSSL v3.6.0 for all architectures (EXPERIMENTAL) EXE	174MB Installer	Installs WinUniversal OpenSSL v3.6.0 for all devices (Only install this EXPERIMENTAL build if you need universal Windows binaries and compiler libraries of OpenSSL for Windows for all architectures - Intel x86, Intel x64, and ARM - includes static binaries and a portable installer variant). Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
Win64 OpenSSL v3.5.4 Light EXE MSI	6MB Installer	Installs the most commonly used essentials of Win64 OpenSSL v3.5.4 (Recommended for users by the creators of OpenSSL). Only installs on 64-bit versions of Windows and targets Intel x64 chips. Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.
Win64 OpenSSL v3.5.4 EXE MSI	281MB Installer	Installs Win64 OpenSSL v3.5.4 (Recommended for software developers by the creators of OpenSSL). Only installs on 64-bit versions of Windows and targets Intel x64 chips. Note that this is a default build of OpenSSL and is subject to local and state laws. More information can be found in the legal agreement of the installation.

After installation, add the OpenSSL bin directory path to the system environment variables under "Path". For example:

D:\Program Files\OpenSSL-Win64\bin



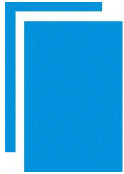
Open Command Prompt and enter the following command to verify if OpenSSL is installed successfully: **openssl version**

```
C:\Users\DELL>openssl version
OpenSSL 3.6.0 1 Oct 2025 (Library: OpenSSL 3.6.0 1 Oct 2025)
C:\Users\DELL>
```


[illegible]

The screenshot shows the Microsoft Azure portal interface for an IoT Hub named 'GT100-MQ-RS-Test'. The left sidebar contains a navigation menu with options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Events, Resource visualizer, and Device management. The 'Certificates' tab is selected and highlighted with a red box and the number 1. The main content area displays a table of certificates with columns: Name, Created, Expires, Subject, and Thumbprint. A red box and the number 2 highlight the '+ Add' button in the Certificates section. On the right, the 'Add certificate' dialog box is open, showing fields for 'Certificate name', 'Certificate .pem or .cer file', and 'Select a file'. A red box and the number 3 highlight this dialog box. The dialog also includes a checkbox for 'Set certificate status to verified on upload' and a note about providing proof of possession.





GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

User Manual

authentication type, then enter the certificate thumbprint in both the "Primary Thumbprint" and "Secondary Thumbprint" fields.

Microsoft Azure | Search resources, services, and docs (G+/I) | Copilot

All services > GT100-MQ-RS-Test | Devices | Overview | Activity log | Access control (IAM) | Tags | Diagnose and solve problems | Events | Resource visualizer | Device management

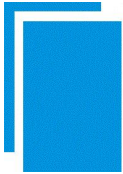
View, create, delete, and update devices in your IoT Hub. [Learn more](#)

+ Add Device | Edit columns | Refresh | Assign tags | Delete

enter device ID | Types: All | + Add filter

Device ID	Type	Status	Last status update	Authentication type	C2D messages queued	Tags
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Self-signed X509 Certificate	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Self-signed X509 Certificate	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Self-signed X509 Certificate	0	
[REDACTED]	IoT Device	Enabled	--	Certificate Authority	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Self-signed X509 Certificate	0	
[REDACTED]	IoT Device	Enabled	--	Certificate Authority	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	
[REDACTED]	IoT Device	Enabled	--	Shared Access Signature	0	

Add or remove favorites by pressing Ctrl+Shift+F



GT100-MQ-IE

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Microsoft Azure

Search resources, se

All services > GT100-MQ-RS-Test | Devices >

Create a device ...

Find Certified for Azure IoT devices in the Device Catalog

Device ID * ⓘ

GT100-MQ-IE-test

☐ IoT Edge Device

Authentication type ⓘ

Symmetric key X.509 Self-Signed X.509 CA Signed

Primary Thumbprint * ⓘ

94A32C

Secondary Thumbprint * ⓘ

94A32C

Connect this device to an IoT hub ⓘ

Enable Disable

Parent device ⓘ

No parent device

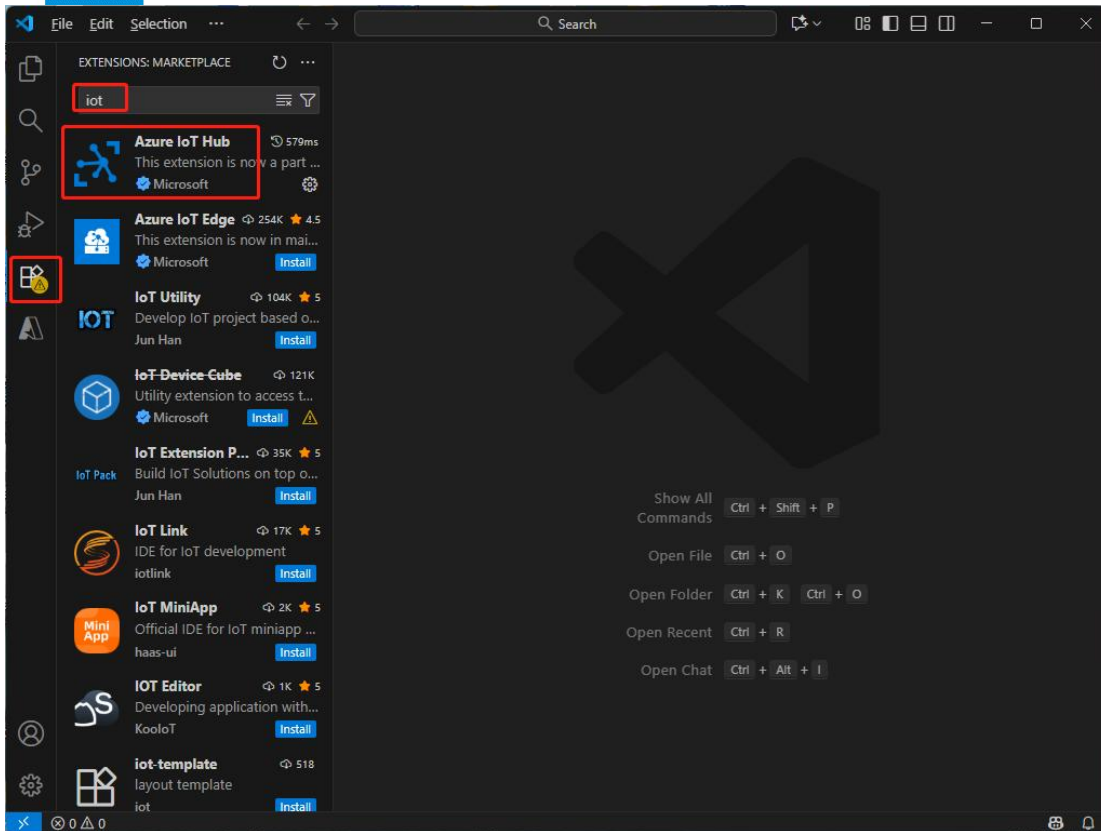
[Set a parent device](#)

Download and install Visual Studio Code, then install the Azure IoT extension and log in with your Azure account:

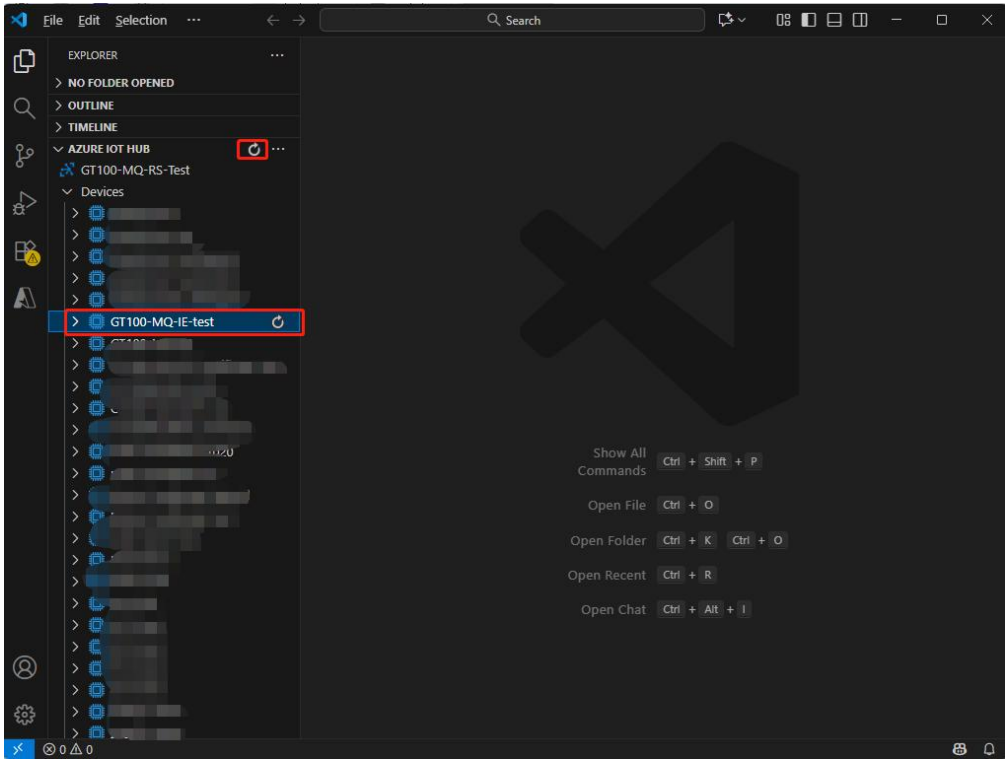
GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

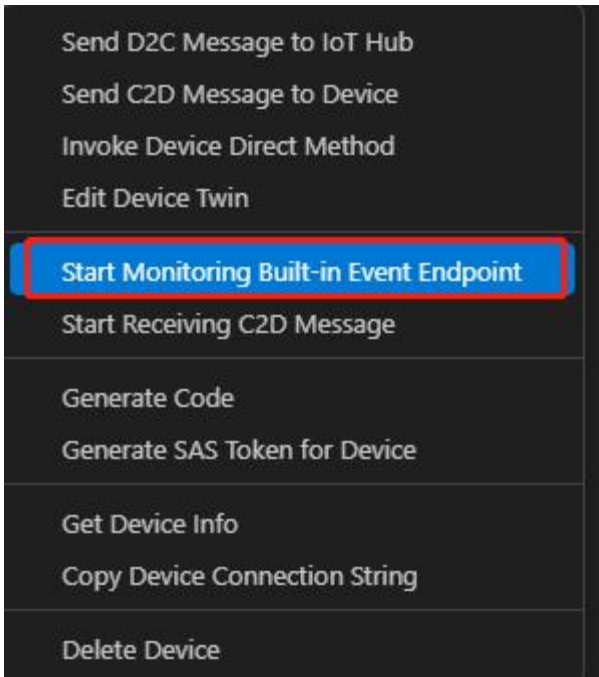
User Manual

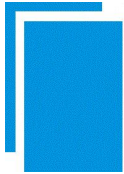


Click the refresh button next to "AZURE IOT HUB" to retrieve the newly added device.



Right-click on the "GT100-MQ-IE-test" device and select "Start Monitoring Built-in Event Endpoint" to monitor the data published by the device.



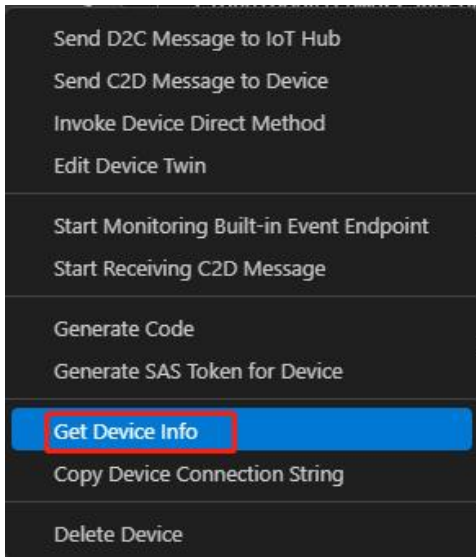


GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

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The device has been successfully created in the Azure IoT platform. To proceed with configuring the GT100-MQ-IE, right-click on the "GT100-MQ-IE-test" device in VSCode and select "Get Device Info" to retrieve the connection details for this device:



```
"connectionString": "HostName=GT100-MQ-RS-Test.azure-devices.net;  
DeviceId=GT100-MQ-IE-test;x509=true"
```

MQTT Broker Username = **HostName/Device ID** =
GT100-MQ-RS-Test.azure-devices.net/GT100-MQ-IE-test

MQTT Broker Address = **HostName** = GT100-MQ-RS-Test.azure-devices.net
MQTT Broker Port = 1883

Client ID = **Device ID** = GT100-MQ-IE-test

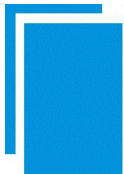
TLS: Enable

CA File=CA Certificate from Azure Platform - Converted PEM Certificate =
DigiCertGlobalRootG2.pem

For instructions on how to obtain the certificate, please refer to: [Azure CA Certificate Conversion](#):

Client Certificate File = OpenSSL-Generated"certificate"

Client Key File= OpenSSL-Generated"privateKey"



GT100-MQ-IE

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Topic Name =devices/**Device ID**/messages/events/ =
devices/**GT100-MQ-IE-test**/messages/events/

Gateway configuration software SST-MQT-CFG -- GT100-MQ-IE

File Edit Tools View Help

New Save Open Add Node Del Node Add Cmd Del Cmd Upload Download AutoMap AutoAssign Conflict Export Debug

Wireless Internet

NB-IoT/eMTC

Advanced Config

MQTT Topic

Topic1

Topic2

Modbus TCP

Node-192.168.0.101-1

Read Coil Status

Read Input Status

Read Holding Registers

Read Input Registers

Modbus RTU/ASCII Subnet

Node-1

Read Coil Status

Read Input Status

Read Holding Registers

Read Input Registers

GPS

Type of MQTT Server	Generic MQTT
MQTT Broker Username	GT100-MQ-RS-Test.azure-devices.net/GT100-MQ-IE-test
MQTT Broker Password	Please input Broker Password
Timestamp	Disable
Publish Mode	Change of Value
Sending Cycle (Seconds)	
APN	Auto Match
MQTT Broker Address	GT100-MQ-RS-Test.azure-devices.net
MQTT Broker Port	8883
Message Type	Property

Gateway configuration software SST-MQT-CFG -- GT100-MQ-IE

File Edit Tools View Help

New Save Open Add Node Del Node Add Cmd Del Cmd Upload Download AutoMap AutoAssign Conflict Export Debug

Wireless Internet

NB-IoT/eMTC

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Modbus RTU/ASCII Subnet

Node-1

Read Coil Status

Read Input Status

Read Holding Registers

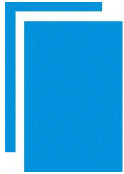
Read Input Registers

GPS

Connect with SST MQTT Gateway	Disable
APN Username	Please input APN Username
APN Password	Please input APN Password
Remote Update Server	Enable
Remote Update Server Address	54.222.133.11
Remote Update Server Port	8885
Appkey	
Client ID	GT100-MQ-IE-test
Custom Message Format	Disable
Edit Message Format	
Packet configuration	Default
TLS	Enable
CA File	GT100-MQ-IE-test/DigiCertGlob ...
Client Certificate File	GT100-MQ-IE-test/certificate(1) ...
Client Key File	GT100-MQ-IE-test/privateKey(1) ...

Config

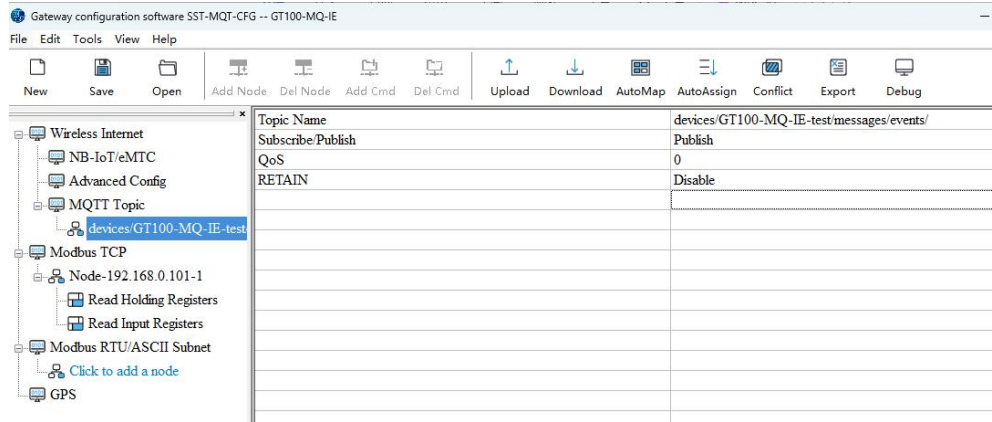
Property



GT100-MQ-IE

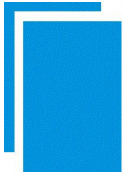
Modbus / Modbus TCP / MQTT Gateway

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Data Received in VSCode After Device Data Change:

Mbslave1				
ID = 1: F = 03				
	Alias	00000	Alias	
0		1234		
1		5678		
2		0		
3		0		
4		0		
5		0		
6		0		
7		0		
8		0		
9		0		



GT100-MQ-IE

Modbus / Modbus TCP / MQTT Gateway

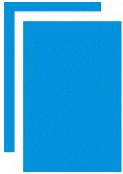
User Manual

```
[Device] [Get] device info: {
  },
  "connectionString": "HostName=GT100-MQ-RS-Test.azure-devices.net;
  DeviceId=GT100-MQ-IE-test;x509=true"
}
[IoTHubMonitor] Start monitoring message arrived in built-in endpoint for device
[GT100-MQ-IE-test] ...
[IoTHubMonitor] Created partition receiver [0] for consumerGroup [$Default]
[IoTHubMonitor] Created partition receiver [1] for consumerGroup [$Default]
[IoTHubMonitor] Created partition receiver [2] for consumerGroup [$Default]
[IoTHubMonitor] Created partition receiver [3] for consumerGroup [$Default]
[IoTHubMonitor] [4:48:59 PM] Message received from [GT100-MQ-IE-test]:
{
  "version": "3.4.4.2",
  "properties": {
    "AI1": 1234
  }
}
[IoTHubMonitor] [4:49:02 PM] Message received from [GT100-MQ-IE-test]:
{
  "version": "3.4.4.2",
  "properties": {
    "AI2": 5678
  }
}
}
```

Azure CA Certificate Conversion:

Obtaining the CA Certificate from the Azure Platform:

https://learn.microsoft.com/en-us/azure/security/fundamentals/azure-ca-details?wt.mc_id=searchAPI_azureportal_inproduct_rmskilling&sessionId=888c8f88d23f481d98eed381da7ble4l&tabs=root-and-subordinate-cas-list



Root Certificate Authorities

Expand table

Certificate Authority	Serial Number / Thumbprint
DigiCert Global Root CA ↗	0x083be056904246b1a1756ac95991c74a A8985D3A65E5E5C4B2D7D66D40C6DD2FB19C5436
DigiCert Global Root G2 ↗	0x033af1e6a711a9a0bb2864b11d09fae5 DF3C24F9BFD666761B268073FE06D1CC8D4F82A4
DigiCert Global Root G3 ↗	0x055556bcf25ea43535c3a40fd5ab4572 7E04DE896A3E666D00E687D33FFAD93BE83D349E
DigiCert TLS ECC P384 Root G5 ↗	0x09e09365acf7d9c8b93e1c0b042a2ef3 17F3DE5E9F0F19E98EF61F32266E20C407AE30EE
DigiCert TLS RSA 4096 Root G5 ↗	0x08f9b478a8fa7eda6a333789de7ccf8a A78849DC5D7C758C8CDE399856B3AAD0B2A57135
Microsoft ECC Root Certificate Authority 2017 ↗	0x66f23daf87de8bb14aea0c573101c2ec 999A64C37FF47D9FAB95F14769891460EEC4C3C5
Microsoft RSA Root Certificate Authority 2017 ↗	0x1ed397095fd8b4b347701eaabe7f45b3 73A5E64A3BFF8316FF0EDCCC618A906E4EAE4D74

Send the following command to convert the certificate format:

openssl x509 -inform der -in DigiCertGlobalRootG2.crt -out DigiCertGlobalRootG2.pem

```
C:\Users\DELL>openssl x509 -inform der -in DigiCertGlobalRootG2.crt -out DigiCertGlobalRootG2.pem
C:\Users\DELL>
```